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Chloroflexi: the Tale of a Bacterium Present in Human and Environmental Habitats

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CHLOROFLEXI
THE TALE OF A BACTERIUM PRESENT IN HUMAN AND ENVIRONMENTAL HABITATS

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ABSTRACT

CHLOROFLEXI
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by

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The phylum Chloroflexi is relatively unexplored, with the majority of its representatives being uncultivable. As a result, these microorganisms have not been characterized beyond their morphology and simple staining reactions, making the study of this phylum extremely challenging. Chloroflexi has been detected in the human oral cavity of patients suffering from peri-implantitis and in the vagina of patients suffering from bacterial vaginosis. Interestingly, Chloroflexi is also present in various environments such as freshwater lakes, soil, deep-sea sponges, hot springs and activated wastewater. Isolation of an environmental Chloroflexi with high 16S rRNA gene homology to a human-associated counterpart could be used as a model to understand its role in human health. The goal of this study was to better characterize Chloroflexi from activated wastewater, where it is known to be abundant, in order to elucidate the relatedness of an environmental analog to a potential human pathogen. Analysis using the 16S rRNA gene clone library generated 230 clones, out of which 67 clones were Chloroflexi. Based on BLAST analysis, about 93% (62 sequences) of the 67 Chloroflexi sequences were homologous to Chloroflexi phylotypes from other environmental sites. The remaining 7% (5 sequences) of Chloroflexi sequences were homologous to human-associated phylotypes derived from samples collected on human skin or human oral cavity. Overall, results suggest that activated wastewater serves as a potential habitat where one can find a human-associated Chloroflexi bacterium analog in order to better characterize this phylum and its contribution to human health.

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This is also an excellent platform to thank my family members and my parents, for having always believed in me. I would like to thank my wonderful husband Deepak Raghu, whose love and encouragement keeps me going, and my blessing and joyous bundle, baby Ishaan Deepak, for being such a darling.

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Introduction

More than 99% of bacteria are uncultivable (Barer and Harwood, 1999; Keller and Zengler, 2004; Rappee and Giovannoni, 2003; Staley and Kanopka, 1985). The two main underlying reasons for their uncultivability are the lack of appropriate growth media and of known supporting growth conditions *in vitro*. Being uncultivable makes understanding these bacteria challenging. Many of these uncultivable bacteria denote new phylotypes, families and divisions in the Bacteria and Archaea domains (Sharma *et al.,* 2005). These uncultivable bacteria play a vital role in various biological processes. For example, *Streptococcus* is used in the dairy industry for manufacturing cheese and yogurt (Saikali *et al*., 2004). *Alcanivorax* and *Cycloclasticus* of the gamma-Proteobacteria were identified as two organisms with major roles in degradation of petroleum hydrocarbons (Harayama *et al*., 2004). On the other hand, some uncultured bacteria are associated with diseases. For example, *Bacteriotedes forsythus* was found to play a role in causing periodontitis (Sabet *et al*., 2003). Hence, studying uncultivable bacteria provides an opportunity to explore poorly characterized species of bacteria, thus providing insight into their diversity and also help in understanding their role in the ecosystem.

Uncultivable bacteria have been studied using special culture-independent techniques such as polymerase chain reaction (PCR), fluorescent *in situ* hybridization and quantitative PCR (Beatrice *et al.*, 2007). These techniques involve using phylogenetic markers or “anchors” such as the 16S ribosomal RNA (rRNA) gene for the characterization of microbial communities from various environments. This latter technique helps to obtain thorough information on genomic DNA and also help us understand the abundance and diversity of the bacterial community present in the environment.

Chloroflexi Etiology

This study makes use of the 16S rRNA as a marker gene to identify a relatively unexplored phylum under the domain Bacteria called Chloroflexi (Beer *et al*., 2002; Bradford *et al.,* 1996). The majority of Chloroflexi representatives are uncultivable. The name Chloroflexi (a.k.a. Chlorobacteria or green non-sulfur bacteria) was derived from the Greek word *chloros*, meaning greenish yellow, and *flexus* in Latin, meaning bending. Hence, Chloroflexi stands for green bending bacteria (Garrity and George, 2005). In 1987, Carl Woese, the forerunner of the molecular phylogeny revolution, divided Eubacteria into 11 divisions based on the 16S ribosomal RNA sequences (Woese, 1987). Woese classified the genera *Chloroflexus*, *Herpetosiphon* and *Thermomicrobium* into a group called “green non-sulfur bacteria and its relatives” (Woese, 1987). This group was later combined into a single class called Chloroflexi (Brenner *et al.,* 2005).

With an increase in newly discovered species, the present deep-branching phylum Chloroflexi is composed of six classes, namely *Chloroflexi* (Gupta *et al*., 2012), *Thermomicrobia* (Hugenholtz and Stackebandt, 2004), *Dehalcoccoidetes* (Hugenholtz and Stackebandt, 2004), *Anaerolineae* (Yamada *et al.*, 2006), *Caldilineae* (Yamada *et al*., 2006) and *Ktedobobacteria* (Cavaletti *et al.,* 2006 ; Yabe *et al.,* 2011). This study focuses on the phylum Chloroflexi.

Literature Review

More than 99% of the bacteria present on Earth are uncultivable (Barer and Harwood, 1999; Keller and Zengler, 2004; Rappe and Giovannoni, 2003; Staley and Kanopka, 1985). Therefore, it is necessary to use culture-independent technique such as PCR, quantitative PCR (qPCR) and fluorescent *in situ* hybridization (FISH) to study these uncultivable bacteria. The culture-independent techniques make use of a molecular marker, such as the 16S rRNA gene, for identification purposes. The 16S rRNA gene is a highly conserved gene, but it does contain nine short hypervariable regions that enable species-specific identification (Pereira *et al.,* 2010; Kolbert *et al.,* 1999). This gene has an ideal length for PCR amplification and DNA sequencing technologies (~1,500 base pairs long) and is inherited vertically, making it the preferred molecule for phylogenetic studies (Weisburg *et al.,* 1991; Brett *et al.,* 1998). Thus, these molecular techniques have emerged as alternatives to phenotypic analysis. Chloroflexi has not been identified beyond its morphology and simple staining reactions (Eikelboom and Van Buijsen, 1981; Jenkins *et al.,* 1993). Interestingly, the advent of various molecular techniques has allowed for an expansion in the understanding of this phylum. Novel lineages of uncultured Chloroflexi was found in soil from the alpine tundra wet meadow regions in the Colorado Rocky Mountains (Costello and Schmidt, 2006). Various clones of 16S rRNA belonging to the phylum Chloroflexi was retrieved from the Niu and Tito Bustillo caves in China. These enriched caves provided an optimal condition for the growth of specialized Chloroflexi (Zhou *et al.,* 2007). Studies conducted in marine sponges from New Zealand using more than 750 16S rRNA gene sequences revealed numerous

Chloroflexi lineages found associated only with certain types of sponges, suggesting a unique ecological role of specific types of Chloroflexi in sponges (Schmitt *et al.,* 2011).

Phylum Chloroflexi could also play an important role in the biogeochemical chlorine cycle (Krzmarzick *et al.*, 2011). Chloroflexi was found to be ecologically significant in the membrane bioreactors treating municipal wastewater and was responsible for the degradation of soluble microbial products (SMP), including organic carbohydrates and cellular materials (Miura *et al.,* 2007).

FISH probes were successfully used to fluorescently tag Chloroflexi cells and to help determine their abundance, morphology and spatial distribution in activated wastewater or sludge (Björnsson *et al.,* 2002). The same study revealed that the predominant morphology of Chloroflexi in wastewater was filamentous, and there could be an abundance of these bacterial cells in biological nutrient removal (BNR) plants globally. BNR plants help treat wastewater before it can be recycled back into the environment.

The species-specific FISH probe (EU25-1238) was designed to identify and determine the abundance and ecophysiological role of Chloroflexi in 126 industrial wastewater treatment samples (Kragelund *et al.,* 2006). Filamentous Chloroflexi was commonly present in municipal and industrial wastewater treatment plants, but was only occasionally associated with bulking process in activated wastewater (Kragelund *et al.,* 2006). Sludge bulking is an undesirable situation in the process of treating wastewater, where the sludge fails to break apart and these large flocks inhibit the full digestion (break down) of organic materials. Sludge bulking is usually associated with large agglomerations of filamentous bacteria, but it does not seem to be correlated with an increase in the number of Chloroflexi filaments.

Host Associated Chloroflexi

A molecular study was conducted to identify and unravel the novel lineages of microorganisms present in the human oral microbiome. This information was used to curate the human oral microbiome database (Dewhirst *et al.,* 2010). A single phylotype (accession number AY331414) from the phylum Chloroflexi was found in the human oral cavity (Dewhirst *et al.,* 2010). Interestingly, this phylotype shared 96% homology with a clone that originated from the canine oral cavity (accession number JN713473) (Dewhirst *et al*., 2012). A second project, conducted to study the canine oral microbiome, showed the presence of a phylotype of Chloroflexi (accession number JN713473) was 86% homologous to a phylotype from the species *Anaerolinea thermophila* procured from activated wastewater. This finding suggests that there are multiple closely-related host-associated species in the phylum Chloroflexi (Dewhirst *et al.*, 2012).

A 16S rRNA gene study was conducted to identify the microbiota in subjects with peri-implantitis (PI), healthy implants and periodontitis-affected teeth (Koyanagi *et al.,* 2010). The results showed that the PI microbiota was the most diverse. Interestingly, bacteria from the phyla Chloroflexi, *Tenericutes* and *Synergistetes* were detected only in patients suffering from PI. However, further studies are needed to establish the role of

Chloroflexi in pathogenicity (Koyanagi *et al.,* 2010). More recently, Chloroflexi bacteria were found in the sublingual sulcus region of the human oral cavity (Kumar *et al.*, 2012).

Pyrosequencing analysis of human microbiota was carried out on healthy Chinese undergraduates to create a baseline for a bacterial profile associated with healthy individuals that could be used to detect diseases in other patients (Zongxin Ling *et al.,* 2013). On analysis, Chloroflexi was seen on the skin surface of the dominant hand of healthy individuals (Zongxin Ling *et al.,* 2013). Another study was carried out to understand the commensal of the human appendix and look for possible microbes that contribute to appendicitis (Guinane *et al.,* 2013). Chloroflexi was seen in the human appendix of patients following appendectomy in relatively low levels (1-2%) (Guinane *et al.,* 2013).

Habitats of Chloroflexi

Chloroflexi has been found in a variety of habitats. Studies using the 16S rRNA for FISH techniques have suggested that there is a noted presence of Chloroflexi in activated wastewater (Björnsson *et al*., 2002). However, knowledge about its role in the biological nutrient removal process is very limited (Björnsson *et al*., 2002). Interestingly, the representatives of this phylum are also present in various other environments such as fresh water lakes (Koizumi *et al*., 2004), soil (Shivaji *et al*., 2011), deep sea sponges (Costello and Schmidt 2006), hot water springs (Schmitt *et al.,* 2011), geothermal springs (Boomer *et al.,* 2002) and hypersaline mats (Nubel *et al*., 2001). They could also be associated with various biotechnological processes such as the biological nutrient removal process, the biogeochemical chlorine cycle or the degradation of soluble microbial products.

These bacteria are also seen in the human oral cavity of patients suffering from peri-implantitis, which is an inflammatory disease that leads to the destruction of soft and hard tissues around osseointegrated implants (Koyanagi *et al*., 2011), and in the vagina of patients suffering from bacterial vaginosis, which is a genital tract syndrome characterized by a thin, white, homogenized vaginal discharge with fishy odor without any vulvo-vaginal symptoms such as pain, irritation, pruritus or dyspareunia (Beatrice *et al.,* 2007).

Studying Chloroflexi from an environmental source such as activated wastewater, where it is known to be abundant, will pave the way understanding the phylogenetic diversity of Chloroflexi. This might help in understanding the relatedness of Chloroflexi from various environments to the human-associated clones (Björnsson *et al.,* 2002). The purpose of this study was to obtain insight on the diversity of Chloroflexi in activated wastewater. This was achieved by constructing a clone library of the 16S rRNA gene of the phylum by PCR amplification using one Chloroflexi-specific primer CFX1223R along with a broad range bacterial primer BAC 8F. The 16S rRNA gene sequences produced from this library were used for phylogenetic analysis. This analysis helped us to determine the relationship between Chloroflexi found in our wastewater samples and those detected in human samples as well as in other environmental sites. In principle, an environmental Chloroflexi with more than 98.5% homology to a human-associated

Chloroflexi could be used as a model organism to understand the role of this organism in human health.

Materials and Methods

Sample collection

Activated wastewater used for this work was obtained from San Jóse-Santa Clara Regional Wastewater Facility. About 200 ml of sludge was collected in a sterile Whirl Pak bag (NASCO, Modesto, CA Cat# B00992 WA). This bag was labeled and transported back to the lab in Styrofoam boxes filled with ice. After reaching the lab, the sample was stored at -20°C in a freezer until prepared for genomic DNA extraction.

Sample Preparation

Activated wastewater contains particulate matter such as humic acid, which interferes with the DNA extraction process. Approximately 30 ml of neat sample was placed into a pair of sterile Sorvall tubes and centrifuged at 9000 rpm for 15 min in a Sorvall centrifuge using an SS34 Sorvall rotor at 4°C. The liquid phase was discarded and the solid phase was used for bacterial genomic extraction.

Bacterial Genomic DNA Extraction

From the solid phase, 0.25 g was placed in a sterile vial and was subjected to a modified half-lysis protocol described by Roh *et al. (*2006). To 0.25 g of solid phase, 10 µl of 10% Triton X-100 and 2.5 µl of 10 mg/ml of proteinase K were added and incubated at 65°C for 30 min. Triton X-100 acts as a denaturing agent of the cell membrane, whereas proteinase K denatures DNAse, which is an enzyme that can potentially break down DNA. In addition, triton X-100 increases the efficiency of proteinase K.

Next, 200 ml of lysis buffer (100mM Tris HCl, pH 7.4; 20 mM EDTA; 5M guanidine isothiocyanate) was added to the sample and vortexed. One half of the sample was left intact. To a fresh tube, the other half of the sample was added to equal amounts of 0.1 mm and 0.5 mm baked zirconium beads for vortexing (Odumeru *et al.,* 2001). This mixture was rapidly agitated in a Biospec Mini Bead beater (Q Biogene, Carlsband, CA) at 5000 rpm for 30 s. The agitated sample was then centrifuged at 16000 g for 3 s to reduce foam formation.

The supernatant was carefully transferred to the tube without beads, and 400 µl of 99% benzyl alcohol was added to this mixture. This was then vortexed for 10 s, which helped to segregate DNA in the top aqueous phase, lipids in the middle phase and proteins in the bottom organic phase based on their densities. The sample was centrifuged at 16000 g for 5 min at 4°C. To this DNA, 20 µl of 3M sodium acetate and 400 µl of 100% ethanol were added and vortexed at 16000 g for about 30 s. The supernatant in the tube was discarded, leaving the DNA in the pellet. The DNA was then resuspended in 500 µl of 70% ethanol and centrifuged at 16000 g for 5 min. The ethanol was carefully removed using a sterile P10 pipette. The pellet was left to air dry for about 5 min and then resuspended in 50 µl of sterile water.

The concentration and purity of the genomic DNA were measured using a Nanodrop ND-1000 spectrophotometer (ND-1000 Version 3.7 Software, Thermo Scientific, and Wilmington, DE). The molecular size was verified by running the genomic DNA on a 0.8% agarose gel and the sample was stored at -20°C immediately until needed for PCR amplification.

16S rRNA Gene Amplification

Hugenholtz *et al.,* (2001) developed a Chloroflexi phylum-specific FISH probe, which was later modified as a PCR primer (Björnsson *et al.,* 2002). In this study, we amplified the Chloroflexi 16S rRNA gene by PCR using the broad-range bacterial forward primer BAC 8F (5′-AGAGTTTGATCCTGGCTCAG-3′) and the Chloroflexi phylum-specific primer CFX 1223R (5′-CCATTGTAGCGTGTGTGTMG-3′) from Björnsson *et al.* (2002).

The PCR master mix of each 12.5 µl per reaction volume consisted of 1x PCR Buffer B (Fischer Scientific, Waltman, Massacheusetts), 1.5 mM $MgCl_2$, 0.2 mM of each deoxynucleoside triphosphate (dNTP), 0.2 pmol each of forward and reverse primer, 1.25x 10^{-2} units of AmpliTaq DNA polymerase (Applied Biosystems, Foster City, California) and 3-30 ng of genomic DNA extracted from the wastewater and diluted 100x in sterile distilled water. The PCR cycle conditions were 95°C for 2 min, followed by 25 cycles of 95°C for 30, 55°C for 1 min and 72°C for 5 min. The PCR was conducted in a 2720 thermal cycler (Applied Bio systems, Foster city, CA). Chloroflexi is relatively abundant in wastewater, so this reaction was optimized to 25 cycles. A lower cycle number is preferred to minimize PCR bias.

PCR Amplicon Purification

The PCR products were purified using E–gel clone well pre-cast 0.8% agarose gels and an E-gel CloneWell Safe-Imager real-time transilluminator (Invitrogen, Carlsbad, CA). These gels contained SYBR DNA gel stain, enabling visualization of bands with a blue (visible) light transillumination, thus minimizing the DNA damage observed in traditional electrophoresis using UV light.

E-gels were pre-run for 2 min with the combs in place before the samples were loaded, to ensure proper resolution of the DNA fragments, as suggested by the manufacturer. The combs were then removed and 20 µl of sample was loaded into each of the wells on the top row, along with 5–10 µl of the molecular marker, E-Gel® 1 Kb Plus DNA ladder (Thermo Fischer Scientific Inc, Waltham, MA), in the center well. This molecular marker was used as a reference to collect the desired DNA sample. Also, 25 µl of DI water was added into all the other empty wells for collection purposes. The samples took approximately 25 min to reach the collection well. The nanodrop concentration of this DNA was found to be 28 µg/µl. The recovered DNA was subsequently used for cloning.

Cloning of PCR Products

The recovered and cleaned PCR amplicons were cloned using the Invitrogen TOPO-TA cloning kit for sequencing (Thermo Fischer Scientific Inc, Waltham, MA, Cat # 450630) according to the manufacturer's instructions. The ligation mixture consisted of 3 µl of PCR product, 1 µl of salt solution, 1 µl of double-distilled water and 1 µl of

PCR™ 4–TOPO vector. TOPO-TA vector is linearized and has a single, overhanging 3' deoxythymidine (T) residue, which allows PCR inserts to ligate efficiently with the vector, as Taq polymerase adds an overhanging deoxyadenosine (A) to the ends of each PCR product. The ligation mixture was incubated at room temperature for approximately 30 min.

Three ml of this ligation mixture was gently added to 1 vial of one-shot TOP 10 chemically competent *Escherichia coli* cells from Invitrogen (Cat # C4040-10) for transformation. These TOP 10 *E. coli* cells had a transformation efficiency of 1 x 10^9 cfu/µg, with supercoiled DNA and were ideal for high efficiency cloning and plasmid propagation. These transformants were subjected to heat shock at 42°C for 30 s, followed by the addition of 250 µl S.O.C medium (supplied with the kit); and was left to grow in a shaker incubator at approximately 180–200 rpm at 37°C for 1 hr. Various volumes ranging from 50 µl to 100 µl of transformants were plated onto selective LB plates containing kanamycin and X-gal for screening.

Screening of Clone Library

The blue-white screening technique was used to select the vector-based recombinants by plating the transformants onto LB agar plates containing a mixture of 50 µl/ml kanamycin and 40 ml of X-gal, followed by incubation at 37°C overnight. The cells that were successfully recombined produced white colonies, while the cells that did not get transformed remained blue in color. The white colonies were selected for verifying the insert using a technique called the lysate screening. The lysates were prepared by adding a few cells from the white colony to 100 µl of sterile water. This mixture was incubated in a 2720 thermo cycler (Applied Biosystems, Foster City, CA) for 10 min at 95°C. The high temperature lysed the cells, releasing the DNA into solution.

The lysate DNA was then PCR amplified using the sequencing primers M13F and M13R to verify the presence and size of the insert. *E coli* clones that contained inserts close to 1200 bps had their plasmids extracted using the Qiagen Prep Spin Miniprep Kit (50). The plasmid DNA extractions were stored at -20°C, whereas the 20% glycerol stocks of each desirable clone were stored in at –80°C until further analysis.

DNA sequencing and Phylogenetic Analysis

The plasmid DNA samples were sent to Sequetech, CA for sequencing. Each sample was first sequenced in only one direction using the M13F (aka ATTP1 5´GTAAAACGACGGCCAG-3´) primer. The sequences were initially analyzed for quality using the software package Codon Code Aligner v 3.0.2 (Codon Code Corporation, Dedham, Massachusetts).

The 16S rRNA gene sequences were then compared to all other published 16S rRNA gene sequences present in the GenBank database, provided by the National Center for Biotechnology Information (NCBI) using a tool called BLAST (Basic Local Alignment Search Tool) (McGinnis and Madden, 2004; Benson *et al*., 2005). This was done to determine the homology or similarity to the already published 16S rRNA gene sequence in the database. The homology between the sequences retrieved from this study compared to the match sequence in GenBank is represented in the form of a percentage. The higher the homology percentage, the greater is the confidence in the results.

Sequences that showed a homology of 98.5% or more with Chloroflexi can be confirmed as those belonging to this phylum. BLAST classified 67 sequences as Chloroflexi, out of which 29 sequences were unique. A unique sequence is one that still matches to Chloroflexi, but for which homology is below 98.5%. Clones with unique sequences were sequenced a second time, now from the other (reverse) direction to attain the full 16S rRNA gene sequence. The second sequence reaction used the universal M13R primer (*aka* ATTP2) (5´-AACAGCTATGACCATG-3´).

The sequencing results were then cleaned and assembled into contigs using Codon Code Aligner. The assembled sequences were stored in FASTA format, and classified into phylogenetic groups using the Ribosomal Database Project (RDP) classifier function (Wang *et al*., 2007). RDP is a 16S rRNA gene database, hosted by the center for Microbial Ecology at Michigan State University. The classified sequences were subjected to BLAST analysis. The sequence that shares the maximum identity to query sequence was selected to construct a phylogenetic tree using Clustal Omega (Fabian *et al*., 2011).

The aligned sequences were uploaded into the MEGA5 (Tamea *et al.,* 2011) program in the MEGA format to construct a phylogenetic tree. MEGA5 uses a neighbor-joining algorithm which pairs submitted sequences to their closest match in the database (Ludwig *et al*., 2004). Closely related sequences were depicted in a phylogenetic tree. Using the neighbor-joining algorithm, the MEGA5 program pairs organisms or a group of organisms in two separate “branches,” which diverge from a common ancestor (Ludwig *et al*., 2004). The point at which the branches separate is called the “node” of the tree. The length of each branch represents how distant the organism is from the common ancestor. Hence, the longer the branch, the more genetically distant that branch is from the common ancestor.

MEGA5 replicates the tree 1000 times to build confidence on its tree topography and assigns a value at each node. The higher this value, the more credible is its relationship to the other organisms. Phylogenetic trees also contain a sequence that is not related to any of the represented sequences and serves as the root of the tree. This distantly related sequence (root) converges with the represented sequences to a common ancestor.

Results

Sample Preparation, Processing and DNA Extraction

Activated wastewater from the secondary treatment aerator tank at the San Jóse - Santa Clara Regional Wastewater Facility was used as a source of microorganisms for this study. The genomic DNA extraction using modified half-lysis protocol resulted in DNA with concentration and purity of 186.2 ng/µl and 1.93, respectively. The A260/280 ratio denotes the purity of DNA, with the expected ideal ratio of 1.80 for the highest purity. A260 is the absorption of the nucleic acid, DNA and RNA, and A280 denotes the absorption of proteins. Because the ratio of the genomic DNA was above 1.80, it suggests the extraction included some RNA in addition to the DNA.

DNA Amplification and Purification

The 16S rRNA gene was amplified from the genomic DNA extracted from activated wastewater by PCR, using the primer pair BAC8F and CFX1223R (Fig. 1). The expected PCR product was approximately 1,200 base pairs long. Neat (undiluted) and diluted genomic DNA were used for initial PCR screening. The neat (10^0) and the 10^{-1} dilution had an inhibitory effect on PCR (Fig. 1, lanes 3 and 4, respectively), whereas dilutions 10^{-2} to 10^{-5} produced clear and distinct bright bands of the desired length. There was no band in the negative control (NC) as expected.

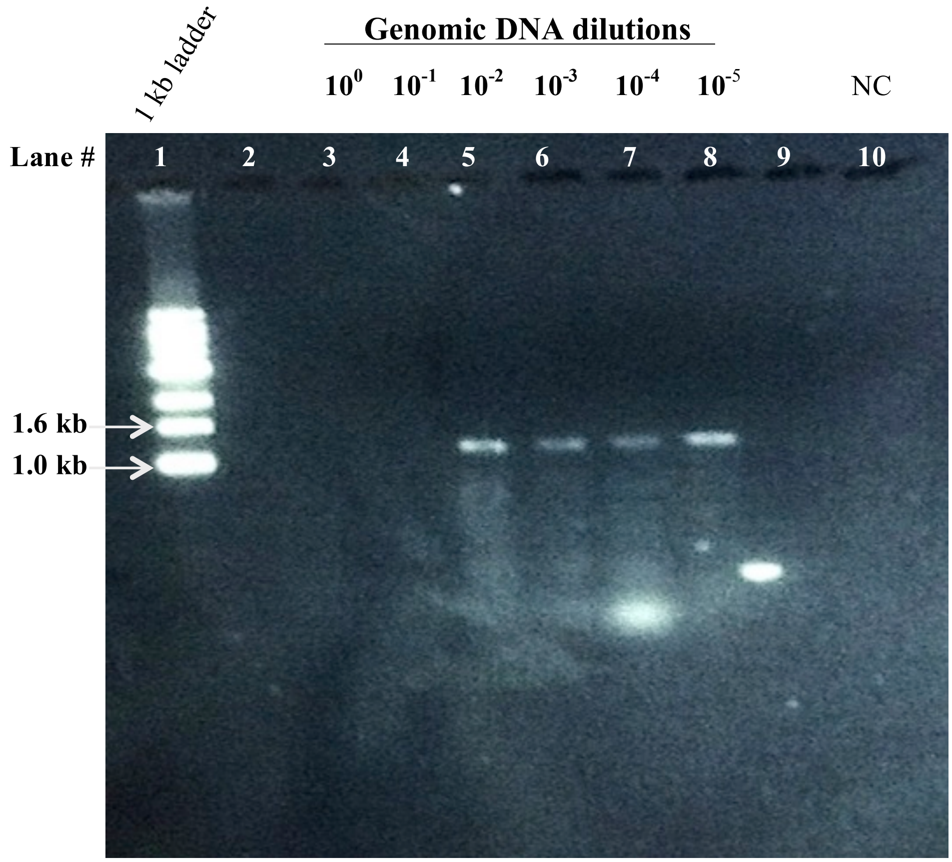

Fig. 1

16S rRNA gene amplification using BAC8F and CFX1223R primer set. Gel electrophoresis image depicting PCR amplification of 16S rRNA gene from activated wastewater genomic DNA, using Chloroflexi- specific primer set BAC8F and CFX 1223R. One Kb molecular weight ladder was used as reference to identify the sample size. Inhibition occurred in both the neat (10^0) and the 10^{-1} PCR reactions. Dilutions from 10^{-2} to 10^{-5} (lanes 5-8) were positive for the expected ~1,200 base pair size band. NC = Negative Control. Lane 2 was empty.

The 10^{-2} dilution of the genomic DNA was used for all downstream processing.

The concentration of the purified DNA using a nanodrop was found to be 28 ng/µl.

Cloning PCR Product and Library Screening

A bacterial 16S rRNA gene clone library containing 230 clones was constructed as a result of four cloning procedures, named Batches A, B, C and D.

The Batch A cloning library was the smallest, producing only four clones. All four clones were submitted for sequencing and none of the sequences belonged to Chloroflexi. One sequence was classified in the phylum Proteobacteria, while the other three sequences returned as poor quality sequences were discarded (Fig. 2).

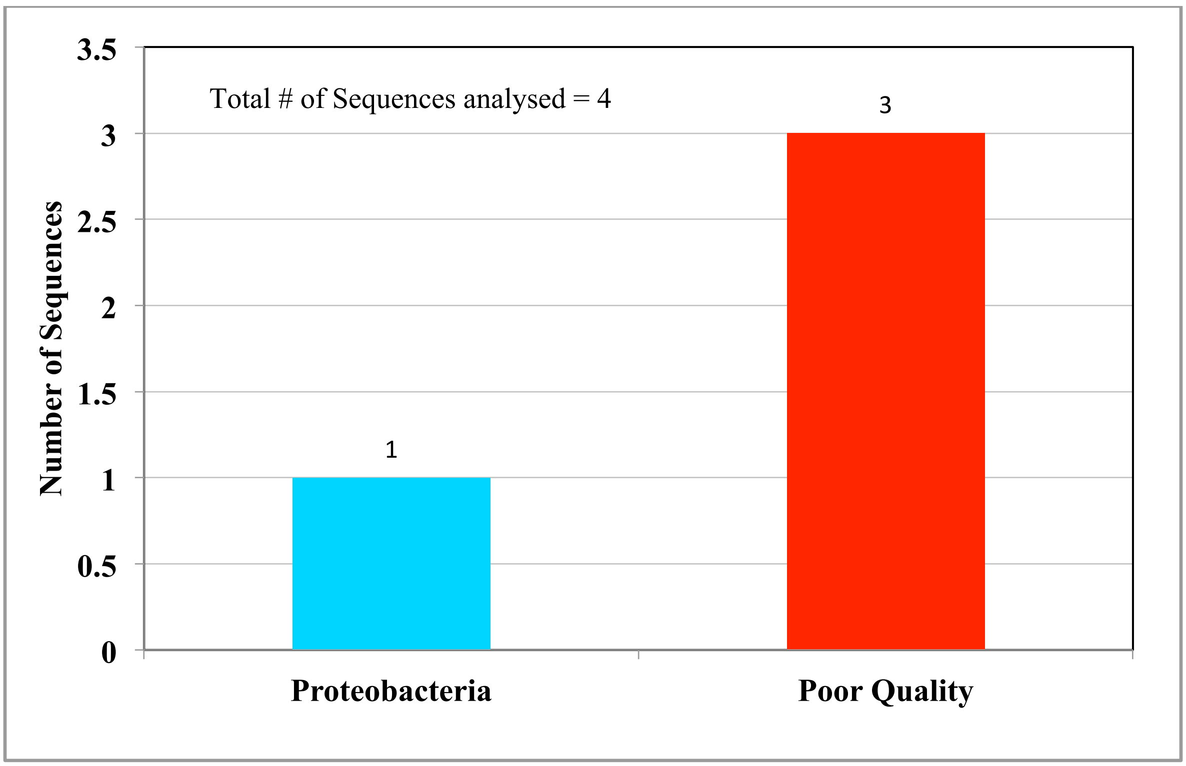

Fig. 2

Batch A 16S rRNA Sequences. The primer sets did not identify any chloroflexi sequences in this library.

The Batch B cloning library produced six clones. All six clones were submitted for sequencing and two of the six sequences were classified in the phylum Chloroflexi (Fig. 3). Two sequences were classified as uncultured bacteria and two sequences were classified as *Streptococcus suis*.

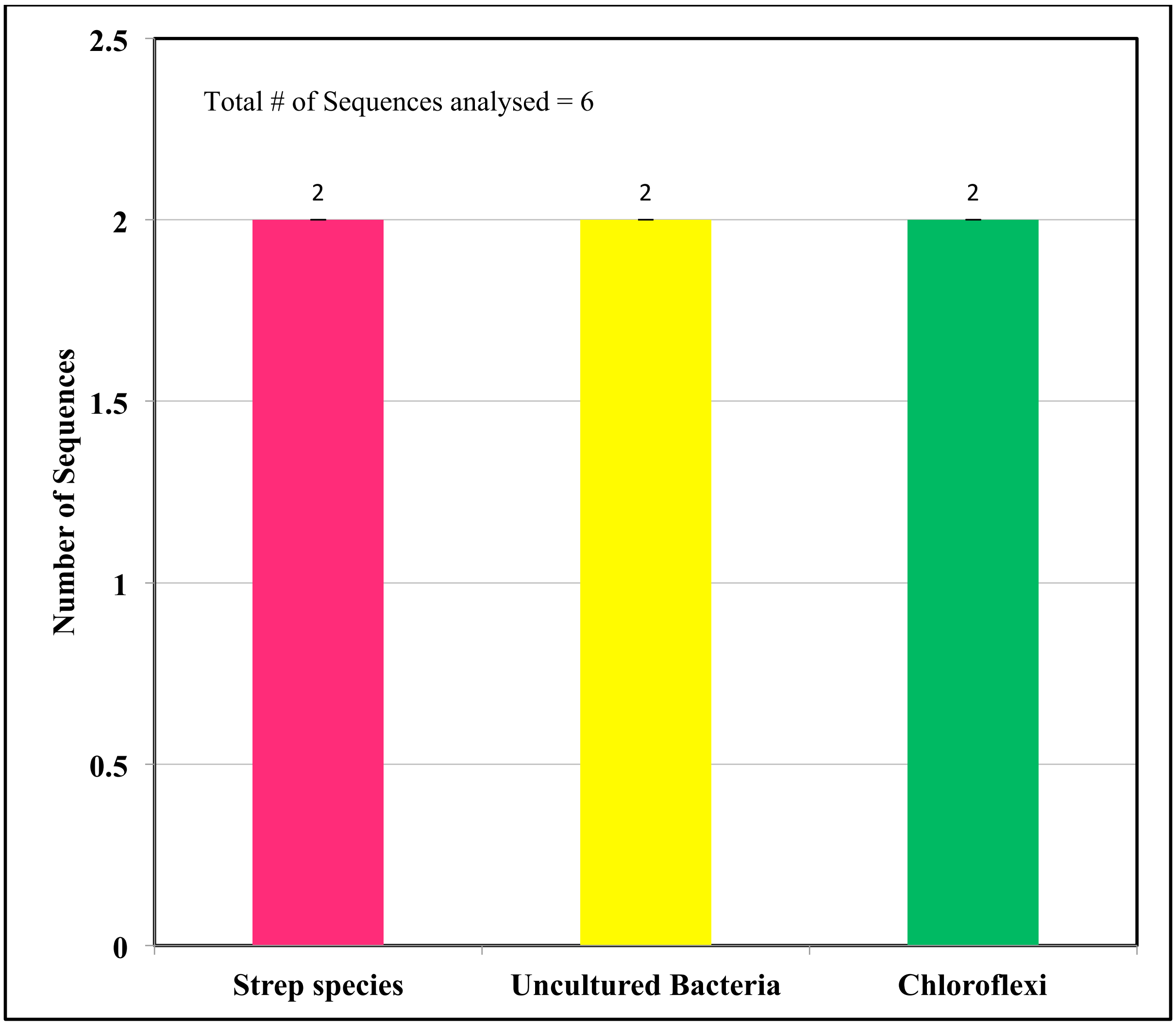

Fig. 3

Batch B 16S rRNA Sequences from this study. Two sequences were identified in the phylum Chloroflexi using the phylum specific primer sets

The Batch C cloning library produced a total of 96 clones. All 96 clones were sent for sequencing and 22 sequences belonged to Chloroflexi (Fig. 4). Thirty six sequences were classified as phylum Proteobacteria, 17 sequences were classified as phylum Bacteriotedes, Twelve sequences were classified as uncultured bacteria, three sequences were classified in the phylum Firmicutes and one sequence was classified in the Candidate division TM7. Five sequences were returned as poor quality and were discarded.

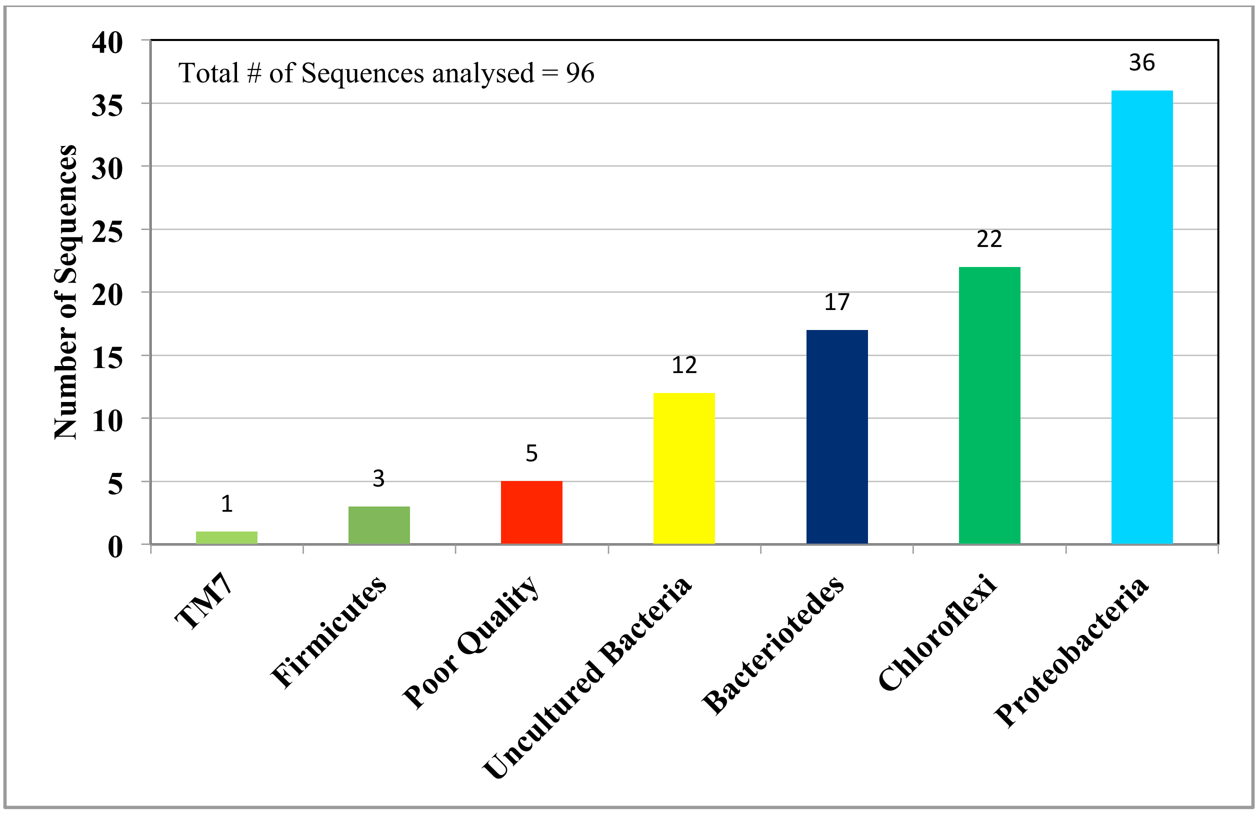

Fig. 4

Batch C 16S rRNA Sequences from this study. Chloroflexi was the second most abundant phylum in this library.

The batch D clone library was the largest and produced a total of one hundred and twenty four clones. All one hundred and twenty four clones were sent for sequencing. Phylum Proteobacteria was the most abundant with fifty one sequences classified in them (Fig. 5). Forty three sequences were classified in phylum Chloroflexi, fourteen sequences were classified in the phylum Bacteriotedes, seven sequences were classified in uncultured bacteria, three sequences were classified in the phylum Firmicutes, two sequences were classified in the phylum Actinobacteria and one sequence was classified in the phylum Fusobacteria. Two sequences were returned as poor quality and were discarded.

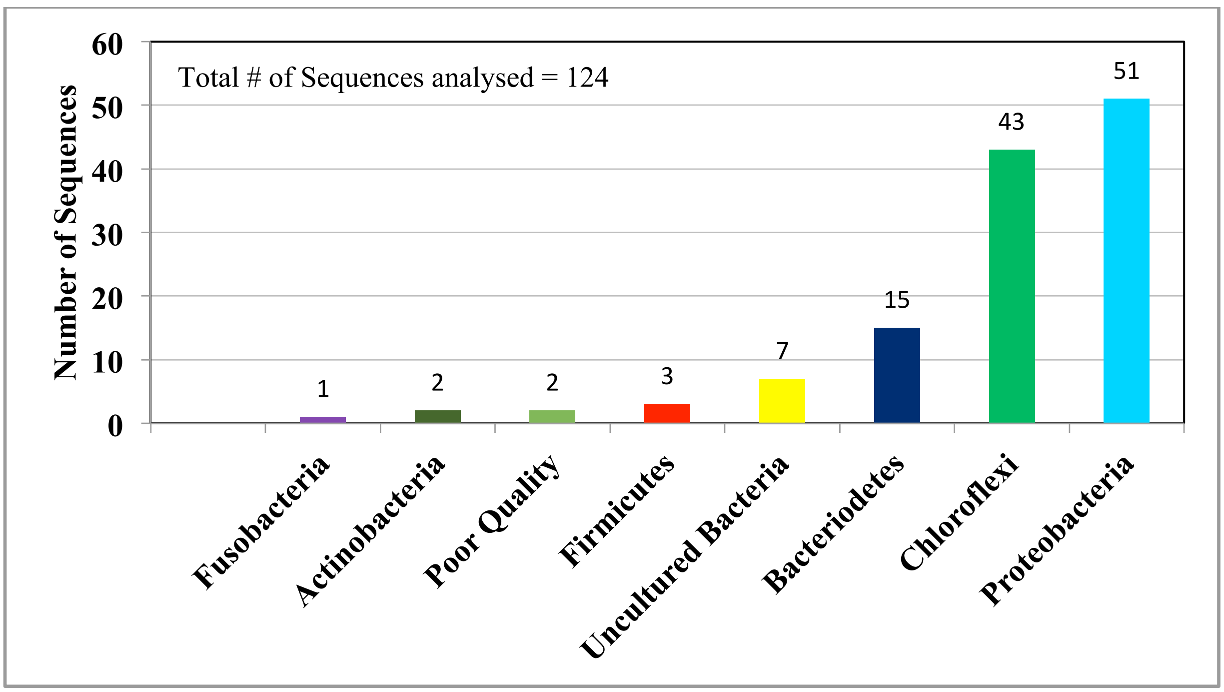

Fig. 5

Batch D 16S rRNA Sequences from this study**.** Chloroflexi was the second most abundant phylum identified in this library.

Overall, of the 230 sequences we generated, 88 were classified in the phylum Proteobacteria (Fig. 6), 67 in the phylum Chloroflexi, 31 in the phylum Bacteriotedes, 21 sequences were classified as uncultured bacteria, seven sequences were classified in the phylum Firmicutes, two sequences were classified as the species *Streptocccus suis,* two sequences were classified in the phylum Actinobacteria, two sequences were classified in the candidate division TM7, and two sequences were classified in the phylum Fusobacteria. In addition, a total of ten sequences were returned as poor quality and were discarded (Fig. 6).

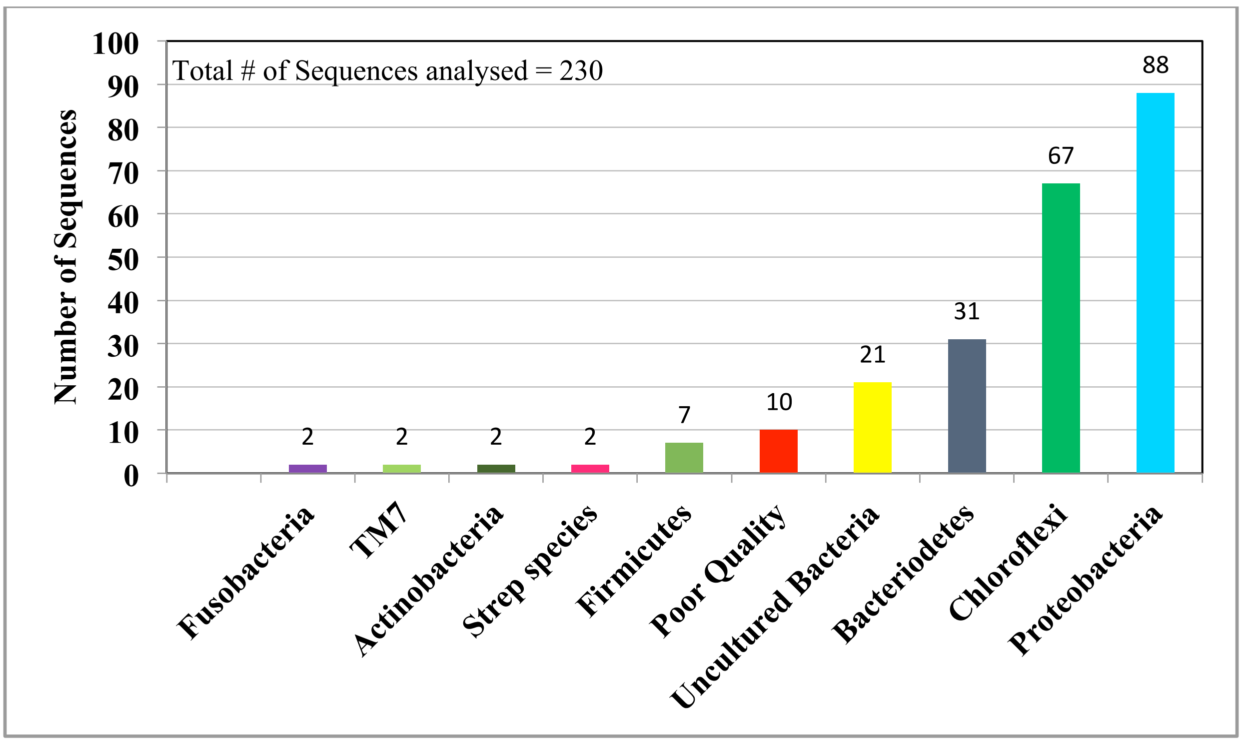

Fig. 6

Combined sequences produced from all four cloning Batches A-D in this study. Chloroflexi was overall second most abundant phylum generated from a clone library with 230 sequences.

Table 1. Summary of sequences retrieved from each respective cloning batch. The 67 total Chloroflexi sequences represented ~29% of all 230 sequences retrieved from this study.

Cloning Batch	# of Sequences (%)[a]	# of Chloroflexi sequences (%)[b]
A	4 (1.74)	0 (0%)
B	6 (2.61)	2 (33.33%)
C	96 (41.74)	22 (22.92%)
D	124 (53.91)	43 (34.68%)
Total	**230 (100)**	**67 (29.13%)**

[a.] Percentage calculated as the number of sequences generated in each library divided by 230 (the total number of sequences generated among all four clone libraries).

[b.] Percentage calculated as the number of Chloroflexi sequences generated in each library divided by the number of sequences generated within that respective library.

Phylogenetic Analysis

Analysis using the 16S rRNA gene clone library generated from activated wastewater, also referred to as sludge, identified 67 clones from the phylum Chloroflexi. Out of those 67 Chloroflexi clones, 38 (~57%) shared a homology of ≥98.5% with already published Chloroflexi sequences, whereas 29 clones (~43%) shared <98.5% homology to previously established phylotype and therefore were determined to be unique.

Among the total 230 16S rRNA gene sequences retrieved in this study, 31 were Bacteroidetes sequences; 21 were found to be from uncultured bacteria and seven sequences were found to be Firmicute bacteria. Ten sequences were discarded due to poor quality. There were two sequences each from *Streptococcus suis,* Actinobacteria, Candidate Division TM7, Fusobacteria.

The sequencing results were used to produce two phylogenetic trees. Both trees were constructed using the MEGA 5 software. This software makes use of the neighbor-joining algorithm for the tree construction. The first tree (Fig. 7) was constructed using the 29 unique sequences along with 20 published reference sequences in the GenBank database. The sequences were differentiated based on their source, whether associated with humans or various environments. The latter was further subdivided into environmental sequences from this study versus those from other published studies. The second tree (Fig. 8), was constructed using all 67 sequences from this present study, including the 29 unique Chloroflexi sequences in Fig. 7, plus the 20 reference published

Chloroflexi sequences in the GenBank database. Archaea clone number EF584763 (Pei and Zhu, 2007) was used as outgroup or root to construct each tree.

The first tree (Fig. 7) was constructed to elucidate the evolutionary relationship of the 29 novel/unique sequences from activated wastewater from the San Jóse -Santa Clara pollution control plant against publically available Chloroflexi sequences from various sources such as humans, non-human hosts, such as animals, and other environmental sources. Bootstrap values greater than 50% are indicated in the tree. With the help of bootstrap resampling, five clades emerged. They are named from the left to right (counterclockwise) as clade 1, 2, 3, 4 and 5 respectively.

From the left, placed adjacent to the root is clade 1, characterized by clones predominantly from environmental origin. Six Chloroflexi clones in this clade are from the current study (C61, D123, C97, C89, C20 and D49) and they grouped together with an already published soil clone HQ119039 (Williamson, *et al.,* 2011). Other members categorized under the phylum Chloroflexi from various environments origins include; *Caldilininea aerophila* NR074397 derived from hot springs in Japan (Oguchi *et al.,* 2013), *Sphaerobacter thermophilius* NR042118 derived from aerobic thermophilic sludge in Germany (Hugenholtz and Stackebandt, 2004) and *Dehalogenimonas lykanthroporepellens* NR 044550 derived from contaminated groundwater in USA (Yan *et al.,* 2009). This clade also contained a *Clostridium viridide* bacterial clone NR026204 derived from anaerobic sewage sludge in USA (Buckel *et al*., 1996).

Interestingly, there are two human-associated Chloroflexi clones in clade 1: Clone JF143396 (Kong *et al*., 2012), which is derived from the forearm skin, and clone CQ002644, derived from the skin of the popliteal fossa or the knee pit. The first clade also housed one host-associated clone from the termite gut: AB189692 (Thongaram *et al.,* 2005). Clones C97, C20 and D49 from the present study shared 80% homology with the human forearm skin clone GQ002644 (Grice *et al*., 2009) and clones C61 and C97 from clade 1 shared 80% homology with the human oral clone AY331414, which is a member of clade 2 (de Lillo *et al.,* 2006).

By contrast, Clade 2 housed primarily human and host-associated clones. There were no sequences from the current study that clustered in this branch. The human-associated sequences belonged to clone number AY331414, derived from the human oral cavity (de Lillo *et al.,* 2006), clone JQ471466 derived from the human mouth (Davis *et al.,* 2012), clone GQ093932 derived from human skin (Grice *et al.,* 2009) and clone GQ065846 derived from human skin (Grice *et al.,* 2009). The non-human host-associated clone JN713473, derived from the canine oral cavity in Boston, Massachusetts (Dewhirst *et al.,* 2012), and EU465609 derived from sheep feces in Mongolia (Ley *et al.,* 2008). There were four sequences from the environment; namely, FN563216 from a mesophilic anaerobic biogas digester of beet silage in Germany (Krakat *et al*., 2011), clone NR041355 from a rice paddy soil in Japan (Yamada *et al.,* 2006), clone NR041354 (Yamada *et al.,* 2006) from the digester sludge and clone NR040970 (Yamada *et al.,* 2006) from a thermophilic sludge in Japan.

Clade 3 housed a single phylotype from the adult zebrafish digestive tract: clone DQ814518 (Rawls *et al.* in 2006). There were no members from the current study or any other previously established sequence in the database that branched along with this zebrafish clone. Clade 4 was monophyletic, with eight sequences; all from the activated wastewater sample in this study: D52, D62, C91, D29, D61, D53, C47 and D84. Lastly, Clade 5 was also monophyletic, with fifteen unique sequences from the current study. These consisted of clone numbers D133, B8, D105, D19, D72, C85, C48, D27, D75, C56, C81, D94, D68, B1 and D13.

The second phylogenetic tree (Fig. 8) was constructed using all 67 Chloroflexi sequences, which grouped into 4 clades. Clade 1 and 2 mainly consisted of human, host associated clones and some environmental Chloroflexi clones curated in the GenBank Database. Clade 3 was monophyletic with all clones purely from our current study. Clade 4 mainly had clones from our study. It was also closely associated to a clone from human forearm (JF015709), a soil (HQ119039) clone derived from and a bacterium *Caldilininea aerophila* (NR074397) derived from hot spring from Japan.

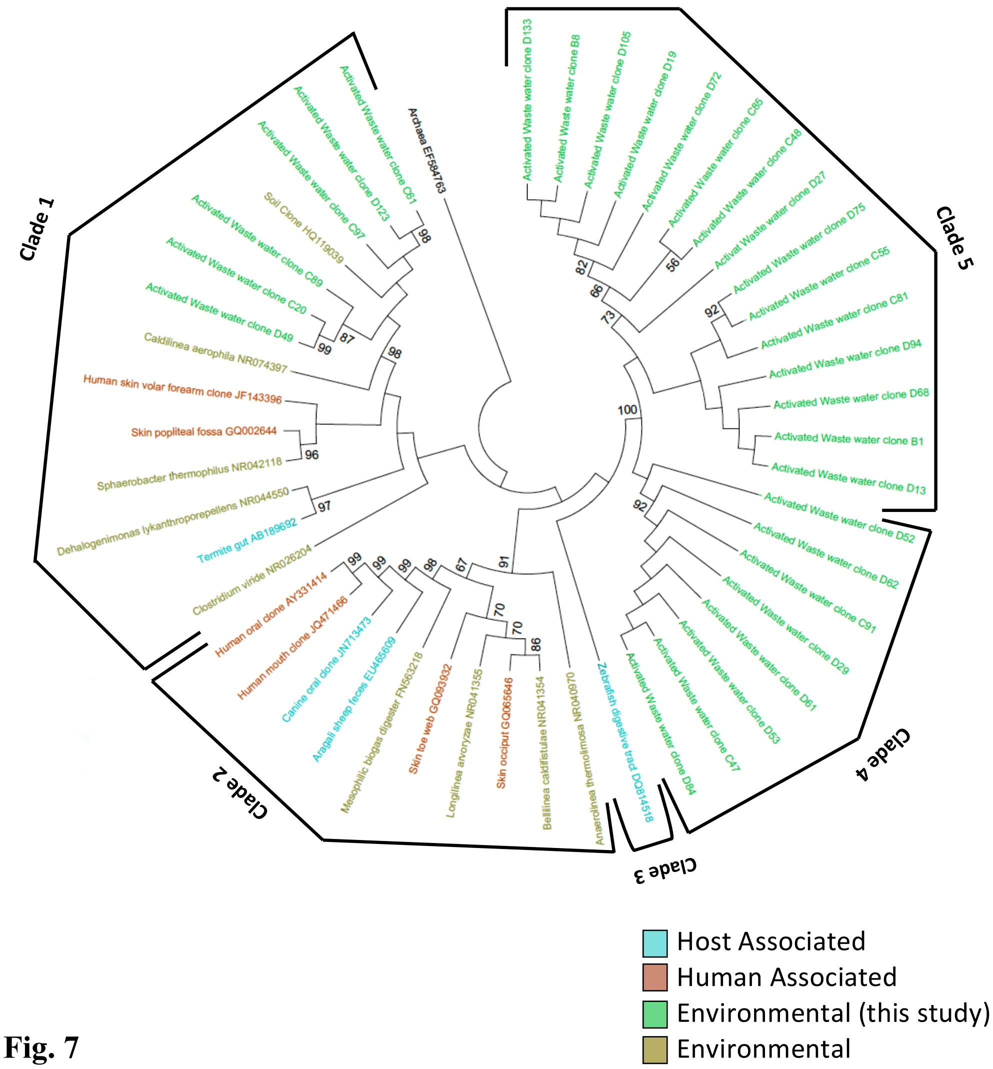

Fig. 7

Phylogenetic Tree Consisting of Unique 16S rRNA Sequences of the phylum Chloroflexi. Tree includes 29 unique 16S rRNA gene sequences obtained from activated wastewater (this study) plus 20 reference sequences from GenBank, derived from humans, hosts or other environmental sources. Tree was built using a neighbor-joining algorithm with nearly complete sequences (~1,200 base pairs). Archaea was used as outgroup.

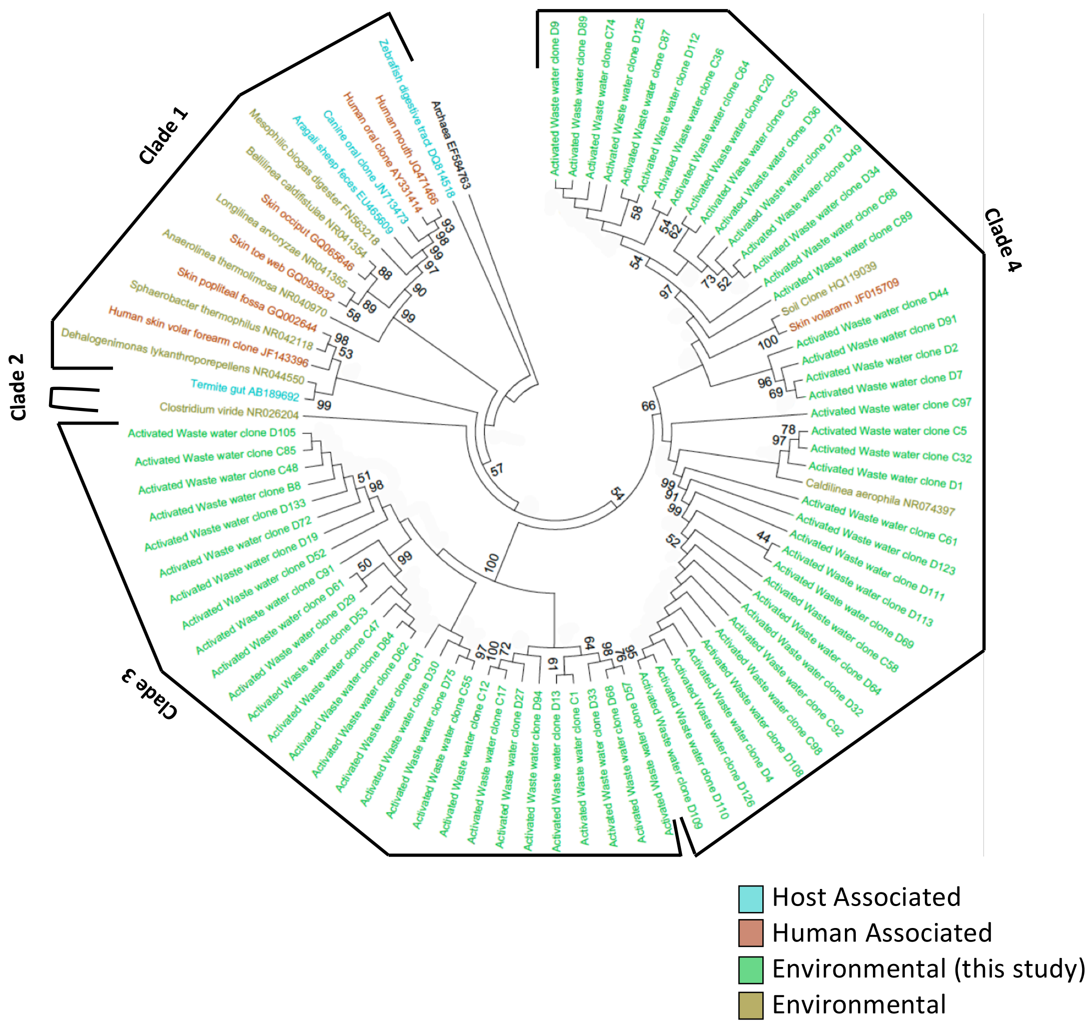

Fig. 8

Neighbor-joining phylogenetic tree of the phylum Chloroflexi containing all 67 sequences. These sequences were obtained from activated wastewater (this study), and out of which 29 were unique. This tree also contains 20 reference sequences from GenBank derived from humans, hosts and other environmental sources, plus one Archaea sequence as outgroup.

Discussion

Chloroflexi is a relatively unexplored and predominantly uncultured phylum under the domain Bacteria. They are present in various environments. Chloroflexi had been previously identified in wastewater (Björnsson *et al.,* 2002); therefore, we decided to use the San Jóse-Santa Clara Regional Wastewater Facility as our sampling site. We were successful in identifying 67 Chloroflexi 16S rRNA gene sequences, out of which 29 sequences (~43%) were new and unique, with no previous representative in the public databases. Hence, the choice of the sampling site proved to be fruitful. This also confirms the presence of Chloroflexi in the San Jóse local wastewater.

Phylogenetic classification of all six phyla based on the BLAST analysis, of which Proteobacteria was the most abundant. However, since we used primers that specifically targeted the phylum Chloroflexi, we expected that Chloroflexi would be the most predominant phylum. Since it was not the most predominant phylum found, this suggests that the primers were not as specific to the phylum of interest. Chloroflexi was the second most abundant phylum present in the library. This result is in agreement with previous studies about the abundance of Chloroflexi in wastewater (Björnsson *et al.,* 2002). Additionally, we were also able to find 21 uncultured bacterial sequences and 2 sequences from rare candidate divisions such as TM7 in our sample.

Based on the BLAST analysis on the 67 Chloroflexi sequences, about 93% (62 sequences) of the Chloroflexi sequences from this study were homologous to Chloroflexi phylotypes from environmental sites. These environmental Chloroflexi sequences belonged to a myriad of environments such as hot water springs, thermophilic sludge and caves. The remaining 7% (5 sequences) of Chloroflexi sequences from the current study were homologous to human-associated phylotypes. These phylotypes were derived from human skin and oral cavity. We were expecting a relatively lower frequency of human associated clone owing to the challenges of deriving human samples. First, collecting samples from a patient suffering from disease is intrusive (vaginal samples) or can cause discomfort. Second, the human biota varies daily, so the body might not harbor the bacteria continuously. Finally, it is challenging to identify patients who harbor the bacteria for continuous sample collection until cultivation is defined.

The three human associated Clones C97, C20 and D49 from the present study shared 80% homology with the human forearm skin clone GQ002644 (Grice *et al.,* 2009), and the other two human associated clones C61 and C97 shared 80% homology with the human oral clone AY331414 (de Lillo *et al.,* 2006). A clone can be termed as an homolog when it shares 98.5% or more homology with the 16S rRNA gene sequence. Therefore, the Chloroflexi sequences from this study cannot be termed as a human homolog.

The principle aim of this study was to characterize phylum Chloroflexi from activated wastewater. We were successful in achieving this aim by using a clone library containing 230 clones. We also categorized Chloroflexi based on the environments it originated from. For instance, environmental Chloroflexi was derived from sources such as caves, sludge, hot water springs. The human or host associated Chloroflexi originated from human skin, oral cavity, and termite gut. This categorization could lay the fundamentals for understanding the presence and role of Chloroflexi in various environments. For instance, previous studies state that Chloroflexi is present in abundance in wastewater treatment plants, but their role in biological nutrient removal process is yet to be completely understood (Björnsson *et al.,* 2002). Also, Chloroflexi is seen in the oral cavity of patients suffering from peri-implantitis. However, their role in causing infection remains unknown (Dewhirst *et al.,* 2010). Thus, more data on the presence of Chloroflexi would aid in understanding their role in the local wastewater.

Our identification of 29 novel Chloroflexi sequences which have never been studied before greatly contributes to the expansion and enhanced knowledge about this phylum. Our study further adds to the already present data on Chloroflexi, broadening the understanding of this phylum.

Conclusion

This study suggests the San Jóse-Santa Clara Regional Wastewater Facility is a potential sampling site to study phylum Chloroflexi. Chloroflexi was the second most abundant phylum present in the wastewater sample. This study also demonstrated that Clones C97, C20 and D49 retrieved from this study shared 80% homology with the published human forearm skin clone GQ002644 (Grice *et al*., 2009), whereas clones C61 and C97 shared 80% homology with the published human oral clone AY331414 (de Lillo *et al.,* 2006). Due to the low homology level (lower than 98.5%), the latter Chloroflexi sequences could not be referred to as human-associated Chloroflexi. Further investigation of the unique group could help to expand the Chloroflexi phylogeny. Finally, finding an environmental clone homologous to human-associated Chloroflexi could help to understand the association of the bacteria from the phylum Chloroflexi with various diseases.

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Appendix A

The following is the list of 29 unique *Chloroflexi* sequences from this study. The letter/number code at the end of each name is the clone number.

>Activated Wastewater sample D

CCCCAGACGTACGGGCCATGCGGACTTGACGTCATCCCCGCCTTCCTCCCCGA
GGGGCAGTCCGGCCAGACACGAGTAACTGGCCGCGGGGGTTGCGCTCGTTGC
GGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCAGCACC
GGTGGCACACCCTCGAAGGCGACCCGCTTTCACGGGCTTGCAGTGCCATGTC
AAACCTGGGTGAGGTTCTGCGCGTTGCGTCGAATTAAACCACACGCTCCGCT
GCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAAGCTTGCGCTCGTACTTC
CCAGGCGGATGACTTACACGTGAGCTGAGACCCGCAGGGGGGTTGAGCCCCC
CACAGGTCGAGTCATCATCGTTTACGGCGTGGACTACCCGGGTATCTAATCCG
GTTCGCTCCCCACGCTCTCGCACCTGAGCGTCAGCACGTTCCCAGTCCCCTGG
CTTCCCCGTGGGTCTTCCTGCCGATCTCTACGCATTTCACCACTACACCGGCA
ATTCGAGGGACCTCTGAACGGCTCGAGCTCGGCCGTAGGAGATGGCCTCGGG
CGGTTAAGCCGCCCGCTTTCACACCTCACGTACCGTGCCGCCTGCGTGCGCTT
TACGCCCAGTAACTCCGGACAACGCTTGCCCCCTCTGTCTTACCGCGGCTGCT
GGCACAGAGTTAGCCGGGGCTTATTCGGGGGGTACCGTCGATGCCGTCCCCC
CCAAAAGGTGTTTACACCCGAAGGCCGTCATCCACCACGCGGCGTTGCTCGG
TCAGGCTTGCGCCCATTGCCGAAAATTCCTTGCTGCTGCCTCCCGTAGGAGTC
TGGGCCGTGTCTCAGTCCAGTCTGGCTGGTCATCCTCCCAGACCAGCGACCCG
TCAAAGGCTTGGTGGGCCGTTACCCCGCCAACAACCTGATGGGGCGCAGGGT
CGTCCGTCCGCGCGGCCGAAGCCGCTTTCCTCCGCGGAGCGTATGCGGGATT
AGCGCTGGTTTCCCAACGTTGTCCCCCACGGTCGGGTCGATCCCCACGTGTTC
CTCAGCCGTGCGCCACTGAGTGACCGAAGCCACCCCGTGCGACTTGCATGCA
TTAGGCACGCCGCCAGCGTTCGTC

>Activated Wastewater sample D84

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TGATATCGGCGGTCTCGCTAGACACGTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAATGGCTCCCCGAAGGGCCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCAGGCGGAATACTTATCGCGTTAGCTGCGGTACAGATAGTTTTGA
GACCACCTGCACCTAGTATTCATCGTCTACCGCGTGGACTACCGGGGTATCTA

ATCCCGTTCGCTCCCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGGG
TGCCGCTTTCGCCACTGGTATTCCTCCCGATCTCTACGCATTCCACCACTACA
CCGGGAATTCTACACCCCTCTCCTCGCCTCAAGCCGCCCAGTCTCCAACGACC
TCTCCCAGTTAAGCCAGGAGCTTTCACGTCAGACTTAAGCAGCCACCTGCGT
GCGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCG
GCTGCTGGCACGTAGTTAGCCGTGACTTATTCCCCAGGTACCGTCCTCGCTCT
TCCCTGAGAAGAGGAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGT
TGCTCGGTCAGGGTTGCCCCCATTGCCGAATATTCCTCACTGCTGCCCCCCGT
AGGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCA
GCTACCGATCATCGCCTTGGTGAGCCTTTACCTCACCAACTAGCTAATCGGCC
GTAGGCCCCTCTCAAAGCACTAAAGCTTTCCTGATAACGATTCCCATCGTCAC
CAGCTTATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGC
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TCTCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample D75

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ATCCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGTCAGTGCCAGGGT
GCCGCTTTCGCCACTGGTATTCCTCCCGATATCTACGCATTCCACCACTACAC
CGGGAATTCTGCACCCCTCTCACCACCTCAAGCCACCCAGTTTCCAACGACCC
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CCCTGTCAAAAGGAGTTTACAGCCCGAAGGCCGTCTTCCTCCACGCGGCGTT
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GCAGACCCCTCCCAGAGCACCAGAGCTTTCCCCACATCTCTTCCCAGATATAT
GGATGTATGCGGTATTAGCCACCGTTTCCAATGGTTATCCCCCACTCCAGGGC
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CCTCACGTTCGACTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D72

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TAAGATCGGCAGTCTCGCTAGACACTTGTAACTAGCGACGAGGGTTGCGCTC
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GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCACTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
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CCGCCTACGCCTAGTACTCATCGTTTACAGCGTGGACTACCGGGGTATCTAAT
CCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGCTAATGCCAGAATGC
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CACAAAAGGAGTTTACAACCCTAAAGCCTTCATCCTCCACGCGGCGTTGCTG
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TCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCCCAGACCAGCTAC
CGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTGGCTAATCGGCCGCGGG
CCCCTCTCAAAGCGATAAATCTTTATCTACTCCATTCCCATCAGAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCAGGTTC
CCACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGA
CTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D68

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CGTAGTCCCCAGGTGGTGAACTTATCGCGTTTGCTGCGGCACCGATGGTGTTT
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TAATCCCGTTTGCTACCCTAGCTGTCGCGTCTGAGCGTCAGAAATGGTCCAGA
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C

>Activated Wastewater sample D62

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GCCCATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGCAG
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>Activated Wastewater sample D61

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>Activated Wastewater sample D53

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>Activated Wastewater sample D52

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CGGGAATTCTACACCCCTCTCCTCACCTCAAGCCATCTAGTTTCCAACGACCT
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GACCATGCGGTATTAGCCACAGTTTCCCGTGGTTATCCCCCACTTCAAGGCAG
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>Activated Wastewater sample D49

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AGCGGAGCGTGTGGTTTAATTCGATGCAACGCGAAGAACCTTACCTAGGCTT
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ACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTC
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GCCTAGGG

>Activated Wastewater sample D133

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CCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATTCCCATCAAAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCAGGTTC
CCACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGA
CTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D123

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GAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTACGGGG
GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCTGACCCAGCAACGCC
GCGTGGAGGATGAAGGCTCTAGGGTTGTAAACTCCTTTTGTGGGGGAAAAGA
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ATACAGGTAGTAGTGAAGCGAAAGCGGAACGGTCTTCGGAAGCCTGAACAG
GTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTCCCGC
AACGAGCGCAACCCTCGTGGCTAGTTACAAGTGTCTAGCCAGACTGCCGATC
TTAAGTCGAAGGAAGGTGGGGATGATGTCAAGTCAGCATGGCCTTTATATCT
GGGG

>Activated Wastewater sample D105

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GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCGCTTCACTACTACCTGT

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TTTACGCCCAGTAATTCCGGATAACGCTTGTCACCTACGTATTACCGCGGCTG
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CGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTAGCTAATCGGCCGCGGG
CCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATTCCCATCAGAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCACTTCGAGGCAGGTTCC
CACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGAC
TTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D29

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GCACCTGTAATGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCAGGCGGAATACTTATCGCGTTAGCTACGGTACAGATAGTTTTGA
GACCACCTACACCTAGTATTCATCGTTTACCGCGTGGACTACCGGGGTATCTA
ATCCCGTTCGCTCCCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGGG
TGCCGCTTTCGCCACTGGTATTCCTCCCGATATCTACGCATTCCACCACTACA
CCGGGAATTCTACACCCCTCTCCTCGCCTCAAGCCGCCCAGTCTCCAACGACC
TCTCCCAGTTAAGCCAGGAGCTTTCACGTCAGACTTAAGCAGCCGCCTGCGT
GCGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCG
GCTGCTGGCACGTAGTTAGCCGTGACTTATTCCCCAGGTACCGTCCTCGCTCT
TCCCTGAGAAAAGGAGTTTACATCCGAAAACCGTCATCCTCACGCGGCGTTG
CTCGGTCAGGGTTGCCCCCATTGCCGAATATTCCTCACTGCTGCCCCCCGTAG
GAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAGC
TACCGATCATCGCCTTGGTGAGCCTTTACCTCACCAACTAGCTAATCGGCCGT

AGGCCCCTCTCAAAGCACTAAAGCTTTCCTGATAACGATTCCCATCGTCACCA
GCTTATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGCAG
GTCACCTGCGTCTTACTCACCCGTCCGCCACTTTCAAGGATACAAGTACCCTC
TCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample D27

CCCTGGTCATAAGGGCCATGATGACTTGACGTCATCCCCACCTTCCTCCGGTT
TGTCACCGGCAGTCTCCCTAGAGTTCCCACCATGACGTGCTGGCAACTAGGG
ACAGGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCT
GACGACAGCCGTGCAGCACCTGTGTCAGTGTTCCCGAAGGCACATCTACCTC
TCGGCAGACTTCACTGCATGTCAAGACCAGGTAAGGTTCTTCGCGTTGCATCG
AATTAAACCACATGCTCCACCGCTTGTGCGGGCCCCCGTCAACTCCTTTGAGT
TTCAACCTTGCGGCCGTACTCCCCAGGCGGTCAACTTAATGCGTTTGCTTCGG
CACAGATGGGTTTAACTCCACCTACGCCTAGTATTCATCGTTTACAGCGTGGA
CTACCGGGGTATCTAATCCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCA
GGCTAATGCCAGAATGCCGCTTTCGCCTCAGATGTTCCCCCCGATATCTACAT
ATTCCACCATTACACCGGGGATTCCGCATTCCTCTCATCGCCTCAAGTCAAAC
AGTGTCCAACGACGTCTTCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATC
TGACCGCCTGCGTGCGCTCTACGCCCAGTAATTCCGGATAACGCTTGTCACCT
ACGTATTACCGCGGCTGCTGGCACGTAGTTAGCCGTGACTTATTCTTGGGGTA
CCATCCATTCTTTTCCCCCACAAAAGGAGTTTACAACCCTAAAGCCTTCATCC
TCCACGCGGCGTTGCTGGGTCAGGCTTTCGCCCATTGCCCAATATTCCTCACT
GCTGCCCCCCGTAGGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGT
CCTCTCAGACCAGCTACCGATAATCGCCTTGGTAAGCCTTTACCTTACCAACT
AGCTAATCGGCCGCGGGCCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATT
CCCATCAGAGCAGAACCGTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCC
CACTTCGAGGCAGGTTCCCACGTGTTACTCACCCGTTTGCCACTTTCAAATAT
TGCTATTCTCACGTTCGACTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D19

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGACT
TAAGATCGGCAGTCTCACTAGACACTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCGCTTCACTACTACCTGT
ATGTCAAACCCGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
CCACCTACGCCTAGTATTCATCGTTTACAGCGTGGACTACCGGGGTATCTAAT

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TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCGCCTGCGTGCGC
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CTGGCACGTAGTTAGCCGTGACTTATTCTTGGGGCACCATCCATTCTTTTCCC
CCACAAAAGGAGTTTACAACCCTAAAGCCTTCATCCTCCACGCGGCGATGCT
GGGTCAGCTTTCGCCCATTGCCCAATATTCCTCACTGCTGCCCCCCGTAGGAG
TCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAGCTAC
CGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTAGCTAATCGGCCGCGGG
CCCCTCTCAAAGCGATAAATCTTTACCTGCTCCATTCCCATCAGAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCAGGTTC
CCACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGA
CTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D13

CCCCGGATATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCTGCT
TCTCGCAGGCAGTCGGGCCAGACACGTGTAACTGACCCCGGGGGTTGCGCTC
GTTTTCGGACTTAACCGAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAGACGCTCCTTGCGGTCGCTCACCTTTCGGCTCGCTACTACGCCT
ATGTCAAACCCGGGTAAGGTTCTTCGTGTAGCCTCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGTCTTGCGACCGT
ACTCCCCAGGCGGCAGACTTATCGCGTTAGCTGTGGCGCCCCCTCCCTTGCGA
GAGTGGACACCGAGTCTGCATCGTTTACGGCTTGGACTACCGGGGTCTCTAAT
CCCGTTCGCTCCCCAAGCTTTCGTGCCTCAGCGTCAGTTGGGACCCAGGACGC
CGCTTCGCCTCTGGTGTTCCTCCGGATCTCTACACATTTCACCGCTCCACCCG
GAATTCCACGTCCCTCTATCCCACTCTAGTCCCACAGTCTCAAGCGCGTATTC
CCGGTTGAGCCGGAACCTTTCACACGTGACTTATGGCACCGCCTGCGCACGC
TTTACGCCCAGTAACTCCGGATAACGCTCGCCTCCTACGTTTTACCGCGGCTG
CTGGCACGTAGTTAGCCGAGGCTTATTCGCCACCTACCGTCCGTTCTCGTCAG
TGGCAAAAGGGCTTTACAACCCGAAGGCCGTCATCACCCACGCGGCGTCGCT
GCATCAGGGTTCCCCCATTGTGCAATATTCCTCACTGCTGCCTCCCGTAGGA
GTCTGGGCCGTGTCTCAGTCCCAGTGTGAGGGATCATCCTCTCAGACCCCTTA
CGCGTCGTTGCCTTGGTAGGCCTTTACCCCACCAACTAGCTGATGCGCCGCAG
CCCCCTCTTCGGGCGTCTTGCCCCTTTTCTCTCTGGTCTCTACAACCCGGGAGC
TTATCCGGTCTTAGCGTCACTTTCGCGACGTTATCCCAGACCCAAAGGCAGGT
TAGCTACGTGTTCCTCACCCGTGCGCCACTATCTTGCGATCGTTCGACTTGCA
TGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample C97

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CAATATCCTTGAAAGTGGCGCACGGGTGAGTAATACGTAGGTAACCTGCCCT
GGAGTGGGGGATAACAACTGGAAACGGTTGCTAACACCGCATAATACCGGA
CATTCGGGAGAGTGACTGGTAAAAACTCTGGTGCTTCAGGAGGGGCCTGCGG
CCGATTAGCTAGTTGGTGGGGTAAAGGCCCACCAAGGCAGTGATCGGTAGCT
GGTCTGAGAGGACGACCAGCCACACGGGAACTGAGACACGGTCCCGACTCT
ACGGGGGGCAGCAGTGAGGAATATTGGGCAATGGGCGCAAGCCTGACCCAG
CAACGCCGCGTGGAGGAAGACGGCCTTCGGGTTGTAAACTCCTTTTACGGGG
GAAGAGGAAGGACGGTACCCCGAGAATAAGTCACGGCTAACTACGTGCCAG
CAGCCGCGGTAATACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAA
AGCGCACGCAGGCGGCGCTGTAAGTCTGACGTGAAATCTCCTGGCTTAACTG
GGAGGGGTCGTTGGAAACTGCAGTGCTTGAGGCGGTGAGAGGGGTGTAGAA
TTCCCGGTGTAGTGGTGGAATGCGTAGATATCGGGGGGAATACCAGTGGCGA
AAGCGGCACCCTGGCACTGGCCTGACGCTCATGTGCGAAGGCGTGGGGAGCG
AACGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTG
TGGGTGGAGTGAAATCCATCTGTGCCGCAGCAAACGCGATAAGTATTCCGCC
TGGGGAGTACGGCCGCAAGGCTAAAACTCAAAGGAATTGACGGGGGCCCGC
ACAAGCAGCGGAGCGTGTGGTTTAATTCGATGCAACACGAAGAACCTTACCT
GGGTTTGGCATACAGGTAGTAGTGAAGCGAAAGCGGAACAATCTTCGGAAGC
CTGTACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTA
AGTCCCGCAACGAGCGCAACCCTCGTCGCTAGTTACAAGTGTCTAGCGAGAC
TGCCGATCTTAAGTCGAAGGAAGGTGGGGATGATGTCAAGTCAGCATGGCCT
TTATATCTGGGG

>Activated Wastewater sample C91

CCCTAGGCATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGATT
TGATATCGGCGGTCTCGCTAGACACGTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAATGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCAGGCGGAATACTTATCGCGTTGGCTGCGGTACAGATAGTTTTGA
GACCACCTACACCTAGTATTCATCGTTTACCGCGTGGACTACCGGGGTATCTA
ATCCCGTTCGCTCCCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGGG
TGCCGCTTTCGCCACTGGTATTCCTCCCGATCTCTACGCATTCCACCACTACA
CCGGGAATTCTACACCCCTCTCCTCGCCTCAAGCCGCCCAGTCTCCAACGACC

TCTCCCAGTTAAGCCAGGAGCTTTCACGTCAGACTTAAGCAGCCACCTGCGT
GCGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCG
GCTGCTGGCACGTAGTTAGCCGTGACTTATTCCCCAGGTACCGTCCTCGCTCT
TCCCTGAGAAAAGGAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGT
TGCTCGGTCAGGGTTGCCCCGTTGCCGAATATTCCTCACTGCTGCCCCCCGTA
GGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCGG
CTACCGATCATCGCCTTGGTGAGCCTTTACCTCACCAACTAGCTAATCGGCCG
TAGGCCCCTCTCAAAGCACTAAAGCTTTCCTGATAACGATTCCCATCAACACC
AGCTTATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGCA
GGTCACCTACGTCTTACTCACCCGTCCGCCACTTTCAAAGATACAGGTACCCT
CTCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample C89

GATGAACGCTGGCGGCGTGCTTAACACATGCAAGTCGAACGTGAGGGTGTAG
CAATATGCCTGAAAGTGGCGAACGGGTGAGTAACACGTAGATGACCTGCCCT
GGAGTGGGGGATAACCACTGGAAACGGTGGCTAATACCGCATACATCCATAT
TTTTGGGAAGAGATGTGGGGAAAGCTCTGGTGCTCTGGGAGGGGTCTGCGTC
CGATTAGCTAGTTGGTGAGGTAAAGGCTCACCAAGGCGACGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAAACTGAGACACGGTCCCGACTCTA
CGGGGGCAGCAGTGAGGAATATTGGGCAATGGGCGAGAGCCTGACCCAGCA
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AGAGAGAGGACGGTACCTGTCGAATAAGTCACGGCTAACTACGTGCCAGCAG
CCGCGGTAATACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAAAGC
GCACGCAGGCGGCTGCTTAGGTCTGACGTGAAATCTCCTGGCTTAACTGGGA
GGGGTCGTTGGAAACTGGGTGGCTTGAGGTGGTGAGAGGGGTGCAGAATTCC
CGGTGTAGTGGTGGAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAAAG
CGGCACCCTGGCCTTGGCCTGACGCTCAGGTGCGAAAGCGTGGGGAGCGAAC
GGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGTAG
GTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGCTAAGTATTCCGCCTGGG
GAGTATGACCGCAAGGTTAAAACTCAAAGGAATTGACGGGGGCCCGCACAA
GCAGCGGAGCGTGTGGTTTAATTCGATGCAACGCGAAGATCCTTACCTAGGC
TTGACGTAGTGGTAGTAGTGAAGTGAAAGCGGAACGACCCTTCGGGGAGCCA
TTACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAG
TCCCGCAACGAGCGCAACCCTCGTCGCTAGTTACACGTGTCTAGCGAGACCG
CCGATATCAGATCGGAGGAAGGTGGGGATGACGTCAAGTCAGCATGGCCTTT
ATGCCTAGGG

>Activated Wastewater sample C85

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGACT
TAAGATCGGCAGTCTCGCTAGACGCTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCACTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
CCACCTACGCCTAGTATTCACCGTTTACAGCGTGGACTACCGGGGTATCTAAT
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CGCTTTCGCCTCAGATGTTCCCCCCGATATCTACATATTCCACCATTACACCG
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TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCACCTGCGTGCGC
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CTGGCACGTAGTTAGCCGATGCTTATTCCTGAGGTACCGTCAGAATTCTTCCC
TCAGAAAAGGAGTTTACGACGAAAACGCCTCCATCCTCCACGCGGTGTTGCT
CCGTCAGGCTTTCGCCCATTGCGGAAGATTCCTCACTGCTGCCTCCCGTAGGA
GTATGGACCGTGTCTCAGTTCCATTGTGGCTGATCATCCTCTCAGACCAGCTA
CCCGTCATAGCCTTGGTAAGCCGTTACCTTACCAACAAGCTGATAGGCCGCA
GGTTCCTCTTAGAGCGCATTACTGCTTTACCCTTGCGGGACAATCCGGTATTA
ACCTCTATTCCTAGAGGGTATCCCTGACTCTAAGGTAGATACCAACGTGTTAC
TCACCCGTCTGCCGCTCCCAGCACTCTGCCTTTGATGACTCAAAGACAAAGTG
CTGGGCGCTCGACTTGCATGTGTTATGCACACCGCCAGCGTTAATC

>Activated Wastewater sample C81

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GCACCTGTATAGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCT
ATATGTCAAACCCAGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGC
TCCGCTACTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCC
GTACTCCCCAGGCGGAGTACTTAGCGCGTTTGCTTCGGCACAGATGGATTTGA
CTCCACCCACACCTAGTACTCATCGTTTACGGCGTGGACTACCCGGGTATCTA
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CCTGGAATTCCACATCCCTCTCCCTGCCTCAAGCCTGGCAGTTTTCGAGGCGC
CCTCCCAGTTGAGCCGGGAGATTTCACCTCAAACTTGCCAGGCCGCCTGCGG

GCTCTTTACGCCCAATAAATCCGGACAACGCTTGACACCTACGTATTACCGCG
GCTGCTGGCACGTAGTTTAGCCGTGTCTTATTCGTGAGGTACCGTCAGAACTT
CTTCCCTCACAAAAGGGGTTTACGACCCGAGGGCCTTCGTCCCCCACGCGGA
ATTGCTGCGTCAGGCTTTCGCCCATTGCGCAAGATTCTTAGCTGCTGCCTCCC
GTAGGAGTCGGGGCCGTATCTCAGTCCCCGTGTGGCTGACCATCCTCTCAGA
CCAGCTACCGATCGTCGCCTTGGTAGGCCATTACCCCACCAACTAGCTAATCG
GCCGCGGGCCCCTCTCATAGCGCCGGAGCTTTACCACCTGGTTTCTCACCAG
GGGTGTTATGCGGTATTAGCTCGCCTTTCGGCGAGTTATTCCCCACTACGAGG
CAGGTTACCCACGTGTTACTCACCCGTTCGCCACTAACCCGAAGGTTCGTACG
ACTTGCATGCCTAATACATTCCGCCAGCGTTTGTC

>Activated Wastewater sample C61

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CAATATGCCTGAAAGTGGCGAACGGGTGAGTAACACGTAGATGACCTGCCCT
GGAGTGGGGGATAACCATTGGAAACGGTGGCTAATACCGCATACATCCATAT
ATCTGGGAAGAGATGTGGGGAAAGCTCTGGTGCTCTGGGAGGGGTCTGCGTC
CGATTAGCTAGTTGGCGAGGTAAAGGCTCACCAAGGCGACGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTGGGCAATGGGCGAGAGCCGACCCAGCA
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AGAGAGAGGACGGTACCTGTCGAATAAGTCACGGCTAACTACGTGCCAGCAG
CCGCGGTAGTACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAAAGC
GCACGCAGGCGGTCAGATAAGTCTGATGTGAAACCTTCTGGCTTAACCAGAA
GACGTCGTTGGATACTGTTTGACTTGAGGCGATGAGAGGAATGCGGAATCCC
CGGTGTAATGGTGGAATATGTAGATATCGGGGGGAACATCTGAGGCGAAAGC
GGCATTCTGGCATTAGCCTGACGCTCATGTGCGAAAGCGTGGGGAGCAAACG
GGATTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTAGGCGTAGG
TGGAGTTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCTGGG
AAGTACGGCCGCAAGGCTAAAACTCAAAGGAATTGACGGGGGCCCGCACAA
GCAGCGGAGCGTGTGGTTTAATTCGATGCAACACGAAGAACCTTACCCAGGT
TTGACATACAGGTAGTAGTGAAGCGAAAGCGGAACGATCTTCGGAAGCCTGT
ACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTC
CCGCAACGAGCGCAACCCTCGTCGCTAGTTACAAGTGTCTAGCGAGACTGCC
GATCTTAAGTCGAAGGAAGGTGGGGATGATGTCAAGTCAGCATGGCCTTTAT
ATCTGGG

>Activated Wastewater sample C55

CCCTGGATATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGGTT
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GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTATAGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCT
ATATGTCAAACCCAGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCC
GTACTCCCCAGGCGGAGTACTTAGCGCGTTTGCTTCGGCACAGATGGATTTGA
CTCCACCCACACCTAGTACTCATCGTTTACAGCGTGGACTACCGGGGTATCTA
ATCCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGTCAGTGCCAGGGT
GCCGCTTTCGCCACTGGTATTCCTCCCGATATCTACGCATTCCACCACTACAC
CGGGAATTCTGCACCCCTCTCACCACCTCAAGCCACCCAGTTTCCAACGACCC
CTCCCAGTTAAGCCAGGAGATTTCACGTCAGACTTAAGCAGCCGCCTGCGTG
CGCTTTACGCCCAGTAATTCCGGATAACGCTTGTCACCTACGTATTACCGCGG
CTGCTGGCACGTAGTTAGCCGTGACTTATTCGACAGGTACCGTCCTCTCTCTT
CCCTGTCAAAGGGAGTTTACAACCCGAAGGCCGTCTTCCTCCACGCGGCGTT
GCTGGGTCAGGCTCTCGCCCATTGCCCAATATTCCTCACTGCTGCCCCCGGTA
GGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAG
CTACCGATCGTCGCCTTGGTGAGCCTTTACCTCACCAACTAGCTAATCGGACG
CAGACCCCTCCCAGAGCACCAGAGCTTTCCCCACATCTCTTCCCAAAAATATG
GATGTATGCGGTATTAGCCACCGTTTCCAGTGGTTATCCCCCACTCCAGGGCA
GGTCATCTACGTGTTACTCACCCGTTCGCCACTTTCAAGGATACAAGTACCCT
CTCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample C48

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGGCT
TAAGATCGGCAGTCTCGCTAGACACTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCGCTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
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CGCTTTCGCCTCAGATGTTCCCCCCGATATCTACATATTCCACCATTACACCG
GGGATTCCGCATTCCCCTCATCGCCTCAAGTCAAACAGTATCCAACGACGTCT
TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCGCCTGCGTGCGC

TTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCGGCTG
CTGGCACGTAGTTAGCCGTGACTTATTCCCCAGGTACCGTCCTCGCTCTTCCC
TGATAAAAGKAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGTTGCT
CGGTCAGGGTTGCCCCCATTGTCCAATATTCCCCACTGCTGCCCCCCGTAGGA
GTCGGGACCGTGTCTCAGTCCCGATGTGGCTGGTCATTCTCTCAAACCAGCTA
AAGATCGTCGCCTTGGTAGGCCTTTACCCTACCAACTAGCTAATCTTACGCGA
GCTCATCTAATAGCGCCTTGCGGCTTTCCCCCGTAGGGCGTATGCGGTATTAA
TCCAGCTTTCGCTGGGCTGTCCCCCTCTACTAGGCAGATTCCCACGTGTTACT
CACCCGTCCGCCGCTCTCAGGGCCGAAGCCCCTACCGCACGACTTGCATGTCT
TAAGCATACCGCCAGCGTTCAAT

>Activated Wastewater sample C47

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GCACCTGTAATGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCAGGCGGAATACTTAGCGCGTTAGCTGCGGTACAGATAGTTTTG
AGACCACCTACACCTAGTATTCATCGTTTACCGCGTGGACTACCGGGGTATCT
ATCCCGTTCGCTCCCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGGG
TGCCGCTTTCGCCACTGGTATTCCTCCCGATCTCTACGCATTCCACCACTACA
CCGGGAATTCTACACCCCTCTCCTCACCTCAAGCCGCCCAGTCTCCAACGACC
TCTCCCAGTTAAGCCAGGAGCTTTCACGTCAGACTTAAGCCGCCACCTGCGTG
CGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCGG
CTGCTGGCACGTAGTTAGCCGTGACTTATTCCTCAGGTACCGTCCTCGCTCTT
CCCTGAGAAAAGGAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGTT
GCTCGGTCAGGGTTGCCCCCATTGCCGAATATTTCCTCACTGCTGCCCCCCGT
AGGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCA
GCTACCGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTAGCTAATCGGCC
GCGGGCCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATTCCCATCAGAGCA
GAACCGTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCA
GGTTCCCACGTGTTACTCACCCGTTTGCCACTTTCAAGTATTGCTATTCTCACG
TTCGACTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample C20

GATGAACGCTAGCGGCGTGCCTAACACATGCAAGTCGAACGTGAGAGGGTAC
TTGTATCCTTGAAAGTGGCGGACGGGTGAGTAAGACGTAGGTGACCTGCCTT

GAAGTGGGGGATAACCATTGGAAACGATGGCTAATACCGCATGGGCTGGTGA
TGATGGGAATCATTATCAGCAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
CGATTAGCTAGTCGGTGAGGTAACGGCTCACCAAGGCGATGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
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ACGCCGCGTGGAGGATGACGGTTTTCGGATTGTAAACTCCTTTTCCCAGGGA
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GCCGCGGTAATACGTAGGTGGCAAGCGTTATCCGGAATTACTGGGCGTAAAG
CGCACGCAGGTGGCGGCTTAAGTCTGACGTGAAAGCTCCTGGCTTAACTGGG
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CCCGGTGTAGTGGTGGAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAA
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ACGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGT
AGGTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGATAAGTATTCCGCCT
GGGGAGTACGACCGCAAGGTTAAAACTCAAAGGAATTGACGGGGGCCCGCA
CAAGCAGCGGAGCGTGTGGTTTAATTCGATGCAACGCGAAGAACCTTACCTG
GTCTTGACATAGCAAGAACTTTCCAGAGATGATTGGTGCCTTCGGGAACTTAC
ATACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAG
TCCCGCAACGAGCGCAACCCTTTTCCTTATTTGCCAGCGGGTTAAGCCGGGA
ACTTTAAGGATACTGCCAGTGACAAACTGGAGGAAGGCGGGGACGACGTCA
AGTCATCATGGCCCTTACGACCAGGG

>Activated Wastewater sample B1

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>Activated Wastewater sample B8

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Appendix B

The following is a list of reference sequences that are host and human associated, along with top hits from BLAST that were used to construct the tree.

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>Aragali_sheep_feces_EU465609

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GAAGGTCAAGTAAAAGAGCGATTTACTTTGGGAGGGGCCTGCGGCCCATCAG
TTAGTTGGTGAGGGTAACGGCCCACCAAGACGAAGACGGGTAGGGGACCTG
AGAGGGTGGTCCCCCACAATGGAACTGAAACACGGTCCATACACCTACGGGT
GGCAGCAGTAGGGAATATTGCTTAATGGGCGAAAGCCTGAAGCAGCAACGC
CGCGTGGACGAAGGAGGCCTTCGGGTCGTAAAGTCCTTTTATGAGGGAAAAG
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>Mesophilic_biogas_digester_FN563218

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CAGCCGCGGTAAAACGTAGGAGGCGAGCGTTATCCGGATTTACTGGGTGTAA
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GGAGAGGTCGTTCAAGACTGTAGGGCTAGAGTGAGGCAGAGGTAGATGGAA
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CAGGGTTTGACATACAAGTGGTAGTGAAGCGAAAGCAGAACGACCCTTCGGG
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GTTAAGTCCGCTAACGAGCGCAACCCTTGTTGTGTGTTACACGTATCACGCAA
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GCCTATATATCCTGGG

>Soil_Clone_HQ119039

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GTCTGAGAGGATGATCAGTCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTGCACAATGGACGAAAGTCTGATGCAGC
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GTTTGACATGCATGTAGTAGTGAAGCGAAAGCGGAACGACCCTTCGGGGAGC
ATGCACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTA
AGTCCCGCAACGAGCGCAACCCCTGTGGCTAGTTACAAGTGTCTAGCCAGAC
TGCCGACATCAAGTTGGAGGAAGGTGGGGATGATGTCAAGTCAGCATGGCCT
TTATATCTGGGG

Appendix C

These are all the 67 *Chloroflexi* sequences derived from this study. The letter/number code at the end of each name is the clone number.

>Activated Wastewater sample D91

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GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTCGTCAATGGGGGGGAACCCTGAACGAG
CAACGCCGCGTGGAGGATGAAGGCCCTTGGGTTGTAAACTCCTTTTCGGAGG
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CGGGATTAGATACCCCGGTAGTCCACGCCGTAAACGATGAATACTAGTGTGG
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>Activated Wastewater sample D9

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CGATTAGCTAGTTGGTGAGGTAAAGGCTCACCAAGGCGATGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
AACGCCGCGTGGAGGATGACGGTTTTCGGATTGTAAACTCCTTTTCTCAGGGA
AGAGTGAGGACGGTACCTGGGGAATAAGTCACGGCTAACTACGTGCCAGCA
GCCGCGGTAATACGTAGGTGGCAAGCGTTATCCGGAATTACTGGGCGTAAAG
CGCACGCAGGTGGCTGCTTAAGTCTGACGTGAAAGCTCCTGGCCTAACTGGG
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CGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTANGTGTA

GGTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGATAAGTATTCCGCCTG
GGGAGTACGACCGCA

>Activated Wastewater sample D89

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CGATGGGAATCGTTATCAGGAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
CGATTAGCTAGTTGGTGAGGTAAAGGCTCACCAAGGCGATGATCGGTAGCTG
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CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
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>Activated Wastewater sample D73

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TGATGGGAATCATTATCAGCAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
CGATTAGCTAGTTGGTGAGGTAACGGCTCACCAAGGCGATGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
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GGGGAGTACGACCGCAAGGTTAAACTCAAAG

>Activated Wastewater sample D7

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GCCGCGGTAATACGTAGGTGGCAAGCGTTATCCGGAATTACTGGGCGTAAAG
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CCGGTGTAGTGGTGGAATGCGTAGATATCGGGAGGAATACCAGTGGCGAAA
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>Activated Wastewater sample D69

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TTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTNGCGTANGTGGA
GTTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCTGGGAAGT
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>Activated Wastewater sample D64

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A

>Activated Wastewater sample D57

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GCATGTCAAGCCCAGGTAAGGTTCTTCGTGTAGCATCGAATTAAACCACACG
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CGTAGTCCCCAGGTGGTGAACTTATCGCGTTTGCTGCGGCACCGATGGTGTTT
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CTCTCCTAGTTGAGCCAGGAGATTTCACGCCCAACTTACCGAACCGCCTGCAC
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>Activated Wastewater sample D44

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>Activated Wastewater sample D4

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GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCATCGC
CGCGTGGAGGATGAAGGCTTTAGGGTTGTAAACTCCTTTTGTGGGGGAAAAG
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TTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTAGGCGTANGTGG
AGTTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCTGGGAAG
TANGNCGCAAGGCTAAACTCAAAGGAATTGACGGGGCCCGCACAGCAGCGG
A

>Activated Wastewater sample D36

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GAAGTGGGGGATAACCATTGGAAACGATGGCTAATACCGCATGGGCTGGTGA
TGATGGGAATCATTATCAGCAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
CGATTAGCTAGTTGGTGAGGTAACGGCTCACCAAGGCGATGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
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GGTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGCTAAGTATTCCGCCTGG
GGAGTACGACCGCAAGGTTAAAACTCAA

>Activated Wastewater sample D34

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TTGTATCCTTGAAAGTGGCGGACGGGTGAGTAAGACGTAGGTGACTTGCCTT
GAAGTGGGGGATAACCATTGGAAACGATGGCTAATACCGCATGAGCTGGTGA
TGATGGGAATCATTATCAGCAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
CGATTAGCTAGTTGGTGAGGTAACGGCTCACCAAGGCGATGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
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CGCCTGCACGCGCTTTACGCCCAGTGAATCCGGATAACGCTCGCCTCCTACGT
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ACGCGGCGTTGCTGCTTC

>Activated Wastewater sample D32

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GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCAACGC
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GGA

>Activated Wastewater sample D30

CCCTGGATATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGGTT
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GCACCTGTCTGCGCTCTCCGAAGAGTCGTTCCCCTTTCGGTTCACTACTACGC
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CTCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGC
CGTACTCCCCAGGCGGAATACTTATCGCGTTTGCTGCGGCACAGATGGATTTC
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AATCCCGTTCGCTCCCCACGCCTTCGCACATGAGCGTCAGGCCAGTGCCAGG
GTGCCGCATTCGCCACTGGTATTCCTCCCGATATCTACGCATTCCACCACTAC
ACCGGGAATTCTACACTCCTCTCACCGCCTCAAGCACTGCAGTTTCCAACGAC
CCCTCCCAGTTAAGCCAGGAGATTTCACGTCAGACTTACAGCGCCGCCTGCG
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TTCCCCCGTAAAAGGAGTTTACAACCCGAAAGCCGTCTTCCTCCACGCGGCG
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TAGAGTCGGGACCGTGTCTCAGTTCCCGTGTNGCTGATCGTCCTCTCAGACCA
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>Activated Wastewater sample D2

GATGAACGCTAGCGGCGTGCCTAACACATGCAAGTCGAACGTGAGGAAGACT
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GTACGGGAGTACGGACAGGTAAAGTTTTGGCGCTTCAAGAGGGGCCTGCGTC
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GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTCGTCAATGGGGGGGAACCCTGAACGAG
CAACGCCGCGTGGAGGATGAAGGCCCTTGGGTTGTAAACTCCTTTTCGGAGG
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GAGAGGTCGTTGGAAACTAGATGGCTTGAGGTGAGGAGAGGGGTGTAGAAT
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CGGGATTAGATACCCCGGTAGTCCACGCCGTAAACGATGAATACTAGTGTGG
GACGTGTCAAAGCGTTCTGTGCCGAAGCCAACGCGATAAGTATTCCGCCTGG
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>Activated Wastewater sample D126

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GAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTACGGGG
GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCAACGC
CGCGTGGAGGATGAAGGCTTTAGGGTTGTAAACTCCTTTTGTGGGGGAAAAG
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TTAGATACCCCGGTAGTCCACGCTGTAAACGATGAGTACTAGGCGTNNCGGA
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>Activated Wastewater sample D125

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CGATGGGAATCGTTATCAGGAAAGCTCTAGTGCTTTGAGAGGGGCCTACGGC
CGATTAGCTAGTTGGTGAGGTAAAGGCTCACCAAGGCGATGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
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AGAGCGAGGACGGTACCTGGGGAATAAGTCACGGCTAACTACGTGCCAGCA
GCCGCGGTAATACGTAGGTGGCAAGCGTTATCCGGAATTACTGGGCGTAAAG
CGCACGCAGGTGGCTGCTTAAGTCTGACGTGAAAGCTCCTGGCTTAACTGGG
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AGCGGCACCCTGGCCTTGGCCTGACGCTCNGTGCGAAAGCGTGGGGAGCGAA
CGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGTA
NTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGATAAGTATTCCGCCTGG
GGGAGTACGACCGCAAGGTTAAACTCAAAGGAATTGA

>Activated Wastewater sample D113

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GGAATGGAGCAGATAAAGATTTATCGCTTTGAGAGGGGCCCGCGGCCGATTA
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GAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTACGGGG
GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCAACGC
CGCGTGGAGGATGAAGGCTTTAGGGTTGTAAACTCCTTTTGTGGGGGAAAAG
AATGGATGGTACCCCAAGAATAAGTCACGGCTAACTACGTGCCAGCAGCCGC
GGTAATACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAGAGCGCAC
GCAGGCGGTCAGATAAGTCTGATGTGAAACCTTCTGGCTTAACCAGAAGACG
TCGTTGGACACTGTTTGACTTGAGGCGATGAGAGGAATGCGGAATCCCCGGT
GTAATGGTGGAATATGTAGATATCGGGGGGGAACATCTGAGGCGAAAGCGG
CATTCTGGCATTAGCCTGACGCTCATGTGCGAAAGCGTGGGGAGCAAACGGG
ATTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTAGGCGTNGTGG
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>Activated Wastewater sample D112

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CGATGGGAATCGTTATCAGGAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
CGATTAGCTAGTTGGTGAGGTAAAGGCTCACCAAGGCGATGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCAACTCCTA
CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
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AGAGCGAGGACGGTACCTGGGGAATAAGTTACGGCTAACTACGTGCCAGCA
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CGCACGCAGGTGGCTGCTTAAGTCTGACGTGAAAGCTCCTGGCTTAACTGGG
AGAGGTCGTTGGAGACTGGGCGGCTTGAGGCGAGGAGAGGGGTGTAGAATT
CCCGGTGTAGTGGTGGAATGCGTAGATATCGGGAGGAATACCAGTGGCGAAA
GCGGCACCCTGGCCTTGGCCTGACGCTCTGGTGCGAAAGCGTGGGGAGCGAA
CGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGTA
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GAGTACGACCGCAAGTTAAACTC

>Activated Wastewater sample D111

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GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCAACGC
CGCGTGGAGGATGAAGGCTTTAGGGTTGTAAACTCCTTTTGTGGGGGAAAGG
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GTAATGGTGGAATATGTAGATATCGGGGGGAACATCTGAGGCGAAAGCGGC
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TTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTNGCGTANGTGGA
GTTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCTGGGAAGT
A

>Activated Wastewater sample D110

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GAGGACGATCAGCCACACGGGAACCGAGACACGGTCCCGACTCCTACGGGG

GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCAACGC
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GGTAATACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAAAGCGCAC
GCAGGCGGTCAGATAAGTCTGATGTGAAACCTTCTGGCTTAACCAGAAGACG
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GTAATGGTGGAATATGTAGATATCGGGGGGAACATCTGAGGCGAAAGTGGC
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TTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTANGCGTANGTGG
AGTTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCTG
>Activated Wastewater sample D109

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GCTAGTTGGTAAGGTAAAGGCTTACCAAGGCGATTATCGGTAGCTGGTCTGA
GAGGACGATCAGCCACACGGGAACCGAGACACGGTCCCGACTCCTACGGGG
GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCAACGC
CGCGTGGAGGATGAAGGCTTTAGGGTTGTAAACTCCTTCTGTGGGGGAAAAG
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GGTAATACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAAAGCGCAC
GCAGGCGGTCAGATAAGTCTGATGTGAAACCTTCTGGCTTAACCAGAAGACG
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TTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTNGCGTNGTGGAG
TTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCTGGGAAGTA
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GA

>Activated Wastewater sample D108

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CGCGTGGAGGATGAAGGCTTTAGGGTTGTAAACTCCTTTTGTGGGGGAAAAG
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AGC

>Activated Wastewater sample C98

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GGGGGATAACGATTGGAAACGGTCGCTAATACCGCACGGTTCTGCTCTGATG
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GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCAACGC
CGCGTGGAGGATGAAGGCTTTAGGGTTGTAAACTCCTTTTGTGGGGGAAAAG
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GCAGGCGGTCAGATAAGTCTGATGTGAAACCTTCTGGCTTAACCAGAAGACG
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AGTTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCCTGGGAA
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>Activated Wastewater sample C92

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GAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTGCGGGG
GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCCTGACCCAGCAACGC
CGCGTGGAGGATGAAGGCTTTAGGGTTGTAAACTCCTTTTGTGGGGGAAAAG
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TTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTNNCGTAGNGGAG
TTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCTGGGAGTAC
GGCCGC

>Activated Wastewater sample C87

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CGATGGGAATGGTTATCAGGAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
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CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGGAACCCTGACCGAGC
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CGCACGCAGGTGGCTGCTTAAGTCTGACGTGAAAGCTCCTGGCTTAACTGGG
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GGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGTAG
GTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGATAAGTATTCCGCCTGG
GGGAGTACGACCGC

>Activated Wastewater sample C74

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CGGGGGGCAGCAGCGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
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AGCGGCACCCTGGCCTTGGCCTGACGCTCNGTGCGAAAGCGTGGGGAGCGAA
CGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGTA
GNGGTCTCAAAACTATCTGTACCGCAGCTAACGCGATAAGTATTCCGCCTGG
GGA

>Activated Wastewater sample C68

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GAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTACGGGG
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CGCGTGGAGGATGACGGTTTTCGGATTGTAAACTCCTTTTCTCAGGGAAGAG
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AGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGTAGGTGGTC
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>Activated Wastewater sample C64

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CGATGGGAATCGTTATCAGGAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
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GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
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GCCGCGGTAATACGTAGGTGGCAAGCGTTATCCGGAATTACTGGGCGTAAAG
CGCACGCAGGTGGCAGCTTAAGTCTGACGTGAAAGCTCCTGGCTTAACTGGG
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CGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTNGNGTAG
GTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGATNAGTATTCCGCCTGG
GGAGTACGACCGCAAGGTTAAAACTCAAAGGAA

>Activated Wastewater sample C58

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TTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTAGGCGTNGTGGA
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>Activated Wastewater sample C5

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CGCACGCAGGCGGCTGCTTAAGTCTGACGTGAAATCTCCTGGCTTAACTGGG
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GGGAGTACGGCCGCAAGGCTAAACTCAA

>Activated Wastewater sample C36

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GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA

CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
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AGAGCGAGGACGGTACCTGGGGAATAAGTCACGGCTAACTACGTGCCAGCA
GCCGCGGTAATACGTAGGTGGCAAGCGTTATCCGGAATTACTGGGCGTAAAG
CGCACGCAGGTGGCTGCTTAAGTCTGACGTGAAAGCTCCTGGCTTAACTGGG
AGAGGTCGTTGGAGACTGGGCGGCTTGAGGCGAGGAGAGGGGTGTAGAATT
CCCGGTGTAGTGGTGGAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAA
AGCGGCACCCTGGCCTTGGCCTGNGCTCNGTGCGAAAGCGTGGGGAGCGAAC
GGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGTGTAGN
GGTCTCAAAACTATCTGTACTGCAGCTAACGCGATAGTATTCCGCCTGGGGA
GTTCGACCGC

>Activated Wastewater sample C35

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GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGC
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AAGAGCGAGGACGGTACCTGAGGAATAAGTCACGGCTAACTACGTGCCAGC
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GCGCACGCAGGTGGCGGCTTAAGTCTGACGTGAAAGCTCCTGGCTTAACTGG
GAGAGGTCGTTGGAGACTGGGCGGCTTGAGGCGAGGAGAGGGGTGTAGAAT
TCCCGGTGTAGTGGTGGAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAA
AGCGGCACCCTGGCCTTGGCCTGACGCTCAGTGCGAAAGCGTGGGGAGCGAA
CGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGTGTAG
NGGTCTCAAAACTATCTGTACCGCAGCTAACGCGATAAGTATTCCGCCTGGG
GAGTACGACCGC

>Activated Wastewater sample C32

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ATCTGGGAAGAGATGTGGGGAAAGCTCTGGTGCTCTGGGAGGGGTCTGCGTT
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GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTGGGCAATGGGCGAGAGCCTGACCCAGC
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CCGGTGTAGTGGTGGAATGCGTAGATATCGGGAGGAATACCAGTGGCGAAA
GCGGCACCCTGGCACTGACCTGACGCTCATGTGCGAAAGCGTGGGGAGCAAA
CGGGATTAGATACCCCGGTAGTCCACGCTGTAAACGATGAGTACTNGTGTGG
GTGGAGTCAAATCCATCTGTGCCGAAGCAAACGCGCTAAGTACTCCGCCTGG
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CAGCGGAGC

>Activated Wastewater sample C17

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ACAGGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCT
GACGACAGCCGTGCAGCACCTGTGTTAGCGTTCCCGAAGGCACTCCCACATC
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CACCGACCCATTAGTTGGAGCCGACGGCTAGTTGACATCGTTTACGGCGTGG
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AGGCAAATGCCAGGGTGTCGCTTTCGCCTCTGGTGTTCCTCCCGATATCTACG
CATTCCACCACTACACCGGGAATTCCACACCCCTCTCATCGCCTCAAGCTTGT
CAGTTTTCAACGGCTGCTCCCGGTTAAGCCGGGAGATTTCACGTCAAACTTAA
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TACGTATTACCGCGGCTGCTGGCACGTAGTTAGCCGTGACTTATTCCCAGGGT
ACCGTCCTCTCTCGTCCCCTGGAAAAGGAGTTTACAACCCGAAGGCCTTCTTC
CTCCACGCGGCGTTGCTGCATCAGGTTTCCCCCATTGTGCAATATTCCTCACT
GCTGCCCCCGTAGANTCGGGACCGTATCTCAGT

>Activated Wastewater sample C12

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GACGACAGCCGTGCAGCACCTGTGTTAGCGTTCCCGAAGGCACTCCCACATC
TCCGCGGGATTCGCTACATGTCAAGGGCTGGTAAGGTTCTTCGCGTTGCATCG
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CACCGACCCATTAGTTGGAGCCGACGGCTAGTTGACATCGTTTACGGCGTGG
ACTACCAGGGTATCTAATCCCGTTTGCTCCCCACGCTTTCGCATCTCAGCGTC
AGGCAAATGCCAGGGTGTCGCTTTCGCCTCTGGTGTTCCTCCCGATATCTACG
CATTCCACCACTACACCGGGAATTCCACACCCCTCTCATCGCCTCAAGCTTGT
CAGTTTTCAACGGCTGCTCCCGGTTAAGCCGGGAGATTTCACGTCAAACTTAA
CTAGCCGCCTGCATGCGCTTTACGCCCAGTAATTCCGGATAACGCTCGCCACC

TACGTATTACCGCGGCTGCTGGCACGTAGTTAGCCGTGACTTATTCCCAGGGT
ACCGTCCTCTCTCGTCCCCTGNNAAAGGAGTTTACAACCCGAAGGCCTTCTTC
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GCTGCCCCCCG
>Activated Wastewater sample D1

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GGAGTGGGGGATAACCATTGGAAACGGTGGCTAATACCGCATACATCCATAT
ATCTGGGAAGAGATGTGGGGAAAGCTCTGGTGCTCTGGGAGGGGTCTGCGTC
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CGGGGGGCAGCAGTGAGGAATATTGGGCAATGGGCGAGAGCCTGACCCAGC
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GCCGCGGTAATACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAAAG
CGCACGCAGGCGGCTGCTTAAGTCTGACGTGAAATCTCCTGGCTTAACTGGG
AGGGGTCGTTGGAAACTGGGTGGCTTGAGGTGGTGAGAGGGGTGCAGAATTC
CCGGTGTAGTGGTGGAATGCGTAGATATCGGGAGGAATACCAGTGGCGAAA
GCGGCACCCTGGCACTGACCTGACGCTCATGTGCGAAAGCGTGGGGAGCAAA
CGGGATTAGATACCCCGGTAGTCCACGCTGTAAACGATGAGTACTANGTGTG
GGTGGAGTCAAATCCATCTGTGCCGAAGCAACGCGCTAAGTACTCCGCCTGG
GGAGTACGGCCGCAAGGCTAAACTC

>Activated Wastewater sample D94

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GGGGCAGTCCGGCCAGACACGAGTAACTGGCCGCGGGGGTTGCGCTCGTTGC
GGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCAGCACC
GGTGGCACACCCTCGAAGGCGACCCGCTTTCACGGGCTTGCAGTGCCATGTC
AAACCTGGGTGAGGTTCTGCGCGTTGCGTCGAATTAAACCACACGCTCCGCT
GCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAAGCTTGCGCTCGTACTTC
CCAGGCGGATGACTTACACGTGAGCTGAGACCCGCAGGGGGGTTGAGCCCCC
CACAGGTCGAGTCATCATCGTTTACGGCGTGGACTACCCGGGTATCTAATCCG
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CTTCCCCGTGGGTCTTCCTGCCGATCTCTACGCATTTCACCACTACACCGGCA
ATTCGAGGGACCTCTGAACGGCTCGAGCTCGGCCGTAGGAGATGGCCTCGGG
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TCAGGCTTGCGCCCATTGCCGAAAATTCCTTGCTGCTGCCTCCCGTAGGAGTC
TGGGCCGTGTCTCAGTCCAGTCTGGCTGGTCATCCTCCCAGACCAGCGACCCG
TCAAAGGCTTGGTGGGCCGTTACCCCGCCAACAACCTGATGGGGCGCAGGGT

CGTCCGTCCGCGCGGCCGAAGCCGCTTTCCTCCGCGGAGCGTATGCGGGATT
AGCGCTGGTTTCCCAACGTTGTCCCCCACGGTCGGGTCGATCCCCACGTGTTC
CTCAGCCGTGCGCCACTGAGTGACCGAAGCCACCCCGTGCGACTTGCATGCA
TTAGGCACGCCGCCAGCGTTCGTC
>Activated Wastewater sample D84

CCCTAGGCATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGATT
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GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAATGGCTCCCCGAAGGGCCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
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GCTGCTGGCACGTAGTTAGCCGTGACTTATTCCCCAGGTACCGTCCTCGCTCT
TCCCTGAGAAGAGGAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGT
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AGGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCA
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GTAGGCCCCTCTCAAAGCACTAAAGCTTTCCTGATAACGATTCCCATCGTCAC
CAGCTTATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGC
AGGTCACCTACGTCTTACTCACCCGTCCGCCACTTTCAAGGATACAAGTACCC
TCTCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample D75

CCCTGGATATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGGTT
TTATACCGGCAGTCTCGCTAGACACTTGTAACTAGCGACAGGGGTTGCGCTC
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GCACCTGTATAGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCT
ATATGTCAAACCCAGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCC
GTACTCCCCAGGCGGAGTACTTAGCGCGTTTGCTTCGGCACAGATGGATTTGA
CTCCACCCACACCTAGTACTCATCGTTTACAGCGTGGACTACCGGGGTATCTA
ATCCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGTCAGTGCCAGGGT
GCCGCTTTCGCCACTGGTATTCCTCCCGATATCTACGCATTCCACCACTACAC
CGGGAATTCTGCACCCCTCTCACCACCTCAAGCCACCCAGTTTCCAACGACCC
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AAGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCA
GCTACCGATCGTCGCCTTGGTGAGCCTTTACCTCGCCAACTAGCTAATCGGAC
GCAGACCCCTCCCAGAGCACCAGAGCTTTCCCCACATCTCTTCCCAGATATAT
GGATGTATGCGGTATTAGCCACCGTTTCCAATGGTTATCCCCCACTCCAGGGC
AGGTCATCTACGTGTTACTCGCCCGTTCGCCACTTTCAGGCATATTGCTACAC
CCTCACGTTCGACTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D72

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GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCACTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
CCGCCTACGCCTAGTACTCATCGTTTACAGCGTGGACTACCGGGGTATCTAAT
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TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCGCCTGCGTGCGC
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GGTCAGGCTTTCGCCCATTGCCCATATTCCCTCACTGCTGCCCCCCGTAGGAG
TCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCCCAGACCAGCTAC
CGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTGGCTAATCGGCCGCGGG
CCCCTCTCAAAGCGATAAATCTTTATCTACTCCATTCCCATCAGAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCAGGTTC
CCACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGA
CTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D68

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TAATACCGGCGGTCCTACGTGACACATGTAACACGTAGCGAGGGTTGCGCTC
GTTAGCGGACTTAACCGAACATCTCACGACACGAGCTGACGACAGCCATGCA
ACACCTGTGCAAGCTCCCTTGCGGGTCGTTCACCTTTCAGATCACTACCACTT
GCATGTCAAGCCCAGGTAAGGTTCTTCGTGTAGCATCGAATTAAACCACACG
CTCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGC
CGTAGTCCCCAGGTGGTGAACTTATCGCGTTTGCTGCGGCACCGATGGTGTTT

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ACCGGGAATTCCATCTTCCTCTACCACTCTCAAGTCCGGTAGTATTGAACGAC
CTCTCCTAGTTGAGCCAGGAGATTTCACGCCCAACTTACCGAACCGCCTGCAC
GCGCTTTACACCCAGTGAATCCGGATAACGCTCGCCTCCTACGTTTTACCGCG
GCTGCTGGCATGTAGTTAGCCGAGACTTATTCCTGAGATACTGTCCTTTCTCA
TCTCTCAGAAAAGTGCTTTACGACCCGAAGGCCTTCATCGCACACGCGGCGT
TGCTGCTTCAGGCTTTCGCCCATTGAGCAATATTCCCTACTGCTGCCACCCGT
AGGTGTATGGACCGTGTTTCAGTTCCATTGTGGGGGGCCACCCTCTCAGGTCC
CCTACCCGTCGTCGCCTTGGTGAGCCGTTACCTCGCCAACTAGCTGATGGGAC
GCAGGTCCCTCCCAAAGCGCATTACTGCTTTAGTCATCAGTTTCTAAATCCGA
AGACCACATGCGGTATTAGCAATCCTTTCGGACTGTTGTCCCACACTTTGGGG
TAGGTCACCAACGCGTTACTCACCCGTTCGTCACTAGGATACTCTCGTATTGC
TACTCAAGCACCTCGTTCGACTTGCATGTATTAGGCACGCCGCCAGCGTTCAT
C

>Activated Wastewater sample D62

CCCTAGGCATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGATT
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GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAATGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCGGGCGGAATACTTAGCGCGTTAGCTGCGGTACAGATAGTTTTG
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AATCCCGCTCGCTCCCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGG
GTGCCGCTTTCGCCACTGGTATTCCTCCCGATCTCTACGCATTCCACCACTAC
ACCGGGAATTCTACACCCCTCTCCTCGCCTCAAGCCGCCCAGTCTCCAACGAC
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GCGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCG
GCTGCTGGCACGTAGTTAGCCGTGACTTGTTCCTCAGGTACCGTCCTCGCTCT
TCCCTGAGAAAAGGAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGT
TGCTCGGTCAGGGTGCCCCCATTGCCGAATATTCCTCACTGCTGCCCCCCGTA
GAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAGC
TACCGATCATCGCCTTGGTGAGCCGTTACCTCACCAACTAGCTAATCGGCCGT
AGGCCCCTCTCAAAGCACTAAAGCTTTGCTGATAATGATTCCCATCACCACCA
GCCCATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGCAG
GTCACCTACGTCTTACTCACCCGTCCGCCACTTTCAAGGATACAAGTACCCTC
TCACGTTCGACTTGCATGTGTCAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample D61

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CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCAGGCGGAATACTTATCGCGTTAGCTACGGTACAGATAGTTTTGA
GACCACCTACACCTAGTATTCATCGTTTACCGCGTGGACTACCGGGGTATCTA
ATCCCGTTCGCTCCCCACGCTTTCGCACCAGAGCGTCAGGCCAAGGCCAGGG
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GCTGCTGGCACGTAGTTAGCCGTAACTTATTCCCCAGGTACCGTCCTCGCTCT
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AGGAGTTGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCA
GCTACCGATCATCGCCTTGGTGAGCCTTTACCTCACCAACTAGCTAATCGGCC
GTAGGCCCCTCTCAAAGCACTAAAGCTTTCCTGATAACGATTCCCATCGTCAC
CAGCTTATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGC
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TCTCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample D53

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CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
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GCTGCTGGCACGTAGTTAGCCGTGACTTATTCCTCAGGTACCGTCCTCGCTCT
TCCCTGAGAAAAGGAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGT
TGCTCGGTCAGGGTTGCCCCCATTGCCGAATATTCCCCACTGCTGCCCCCCGT
AGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAG

CTACCGATCATCGCCTTGGTGAGCCGTTACCTCACCAACTAGCTAATCGGCCG
TAGGCCCCTCTCAAAGCACTAAAGCTTTGCTGATAATGATTCCCATCATCACC
AGCTCATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGCA
AGTCACCTACGTCTTACTCACCCGTCCGCCACTTTCAAGGATACAAGTACCCT
CTCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample D52

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ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGGATTAAACCACACGCTC
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AGTCCCCAGGCGGAATACTTATCGCGTTGGCTTCGGCACAGAACGCTTTGAC
ACGTCCCACACCTAGTATTCATCGTTTACGGCGTGGACTACCGGGGTATCTAA
TCCCGTTCGCTACCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGGGT
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CGGGAATTCTACACCCCTCTCCTCACCTCAAGCCATCTAGTTTCCAACGACCT
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CGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCGG
CTGCTGGCACGTAGTTAGCCGTGACTTATTCCGAAGGTACCGTCCTTCCTCTT
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GCTCGTTCAGGGTTCCCCCCATTGACGAATATTCCTCACTGCTGCCCCCCGTA
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TACCGATCATCGCCTTGGTGAGCCGTTACCTCACCAACTAACTAATCGGACGC
AGGCCCCTCTTGAAGCGCCAAAACTTTACCTGTCCGTACTCCCGTACCGACAG
GACCATGCGGTATTAGCCACAGTTTCCCGTGGTTATCCCCCACTTCAAGGCAG
GTTACCTACGTATTACTCACCCGTCCGCCACTTTCAGAAGACCGAAGTCTTCC
TCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample D49

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GGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGCA
ACGCCGCGTGGAGGATGACGGTTTTCGGATTGTAAACTCCTTTTCTCAGGGAA
GAGCGAGGACGGTACCGAGGAATAAGTCACGGCTAACTACGTGCCAGCAGC
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GGTGTAGTGGTGAAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAAAGC
GGCACCCTGGCCTTGGCCTGACGCTCAGGTGCGAAAGCGTGGGGAGCGAACG
GGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGTAGG
TGGTCTCAAAACTATCTGTACCGCAGCTACCGCGCTAGTATTCCGCCTGGGGA
GTACGACCGCAAGGTTAAAACTCAAAGGAATTGACGGGGGCCCGCACAAGC
AGCGGAGCGTGTGGTTTAATTCGATGCAACGCGAAGAACCTTACCTAGGCTT
GACGTAGTGGTAGTAGTGAAGTGAAAGCGGAACGACCCTTCGGGGAGCCATT
ACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTC
CCGCAACGAGCGCAACCCTCGTCGCTAGTTACACGTGTCTAGCGAGACCGCC
GATATCAAATCGGAGGAAGGTGGGGATGACGTCAAGTCAGCATGGCCTTTAT
GCCTAGGG

>Activated Wastewater sample D133

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGACT
TAAGATCGGCAGTCTCGCTAGACACTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCGCTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
CCACCTACGCCTAGTATTCATCGTTTACAGCGTGGACTACCGGGGTATCTAAT
CCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGCTAATGCCAGAATGC
CGCTTTCGCCTCAGATGTTCCCCCCGATATCTACATATTCCACCATTACACCG
GGGATTCCGCATTCCTCTCATCGCCTCAAGTCAAACAGTATCCAACGACGTCT
TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCGCCTGCGTGCGC
TTTACGCCCAGTAATTCCGGATAACGCTTGTCACCTACGTATTACCGCGGCTG
CTGGCACGTAGTTAGCCGTGACTTATTCTTGGGGTACCATCCATTCTTTTCCCC
CACAAAAGGAGTTTACAACCCTAAAGCCTTCATCCTCCACGCGGCGTTGCTG
GGTCAGGCTTTCGCCCATTGCCCAATATTCCTCACTGCTGCCCCCCGTAGGAG
TCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAGCTAC
CGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTAGCTAATCGGCCGCGGG
CCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATTCCCATCAAAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCAGGTTC
CCACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGA
CTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D123

GATGAACGCTGGCGGCGTGCTTAACACATGCAAGTCGAACGTGAGAATAGAA
ATATTTGAAAGTGGCAAACGGGTGAGTAACACGTGGGAACCTGCCCTGGAGT
GGGGGATAACGACTGGAAACGGTCGCTAATACCGCATGGTTCTGTACAGGGT
GGAATGGTACAGATAAAGATTAATTGCTCTAGGAGGGGCCCGCGGCCGATTA

GCTAGTTGGTGAGGTAAAGGCTCACCAAGGCGATTATCGGTAGCTGGTCTGA
GAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTACGGGG
GGCAGCAGTGAGGAATATTGGGCAATGGGCGAAAGCTGACCCAGCAACGCC
GCGTGGAGGATGAAGGCTCTAGGGTTGTAAACTCCTTTTGTGGGGGAAAAGA
GAGGATGGTACCCCAAGAATAAGTCACGGCTAACTACGTGCCAGTAGCCGCG
GTAGTACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAAAGCGCACG
CAGGCGGTGTTATAAGTCTGATGTGAAACCTTCTGGCTTAACCAGAAGACGT
CGTTGGATACTGTAATACTTGAGGCGATGAGAGGAATGCGGAATTCTCGGTG
TAATGGTGGAATATGTAGATATCGAGAGGAACATCTGAGGCGAAAGCGGCAT
TTTAGCATTAGCCTGACGCTCATGTGCGAAAGCGTGGGGAGCGAACGGATT
AGATACCCCGGTAGTCCACGCCGTAAACGATGAATACTAGGCGTAGGGAGAG
TCAAATCTTTCTGTGCCGAAGCCAACGCAATAAGTATTCCGCCTGGGAAGTA
CGGCCGCAAGGCTAAAACTCAAAGGAATTGACGGGGGCCCGCACAAGCAGC
GGAGCGTGTGGTTTAATTCGATGCAACACGAAGAACCTTACCCAGGTTTGAC
ATACAGGTAGTAGTGAAGCGAAAGCGGAACGGTCTTCGGAAGCCTGAACAG
GTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTCCCGC
AACGAGCGCAACCCTCGTGGCTAGTTACAAGTGTCTAGCCAGACTGCCGATC
TTAAGTCGAAGGAAGGTGGGGATGATGTCAAGTCAGCATGGCCTTTATATCT
GGGG

>Activated Wastewater sample D105

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGACT
TAAGATCGGCAGTCTCGCTAGACACTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCGCTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGATTTAACT
CCACCTACGCCTAGTATTCATCGTTTACAGCGTGGACTACCGGGGTATCTAAT
CCCGTTTGCTCCCCACGCTTCCGCACATGAGCGTCAGGCTAATGCCAGAATGC
CGCTTTCGCCTCAGATGCTCCCCCCGATATCTACATATTCCACCATTACACCG
GGGATTCCGCATTCCTCTCATCGCCTCAAGTCAAACAGTATCCAACGACGTCT
TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCGCCTGCGTGCGC
TTTACGCCCAGTAATTCCGGATAACGCTTGTCACCTACGTATTACCGCGGCTG
CTGGCACGTAGTTAGCCGTGACTTATTCTTGGGGTACCATCCATTCTTTTCCCC
CACAAAAGGAGTTTACAACCCTAAAGCCTTCATCCTCCACGCGGCGTTGCTG
GGTCAGGCTTTCGCCCATCGCCCAATATTCCTCACTGCTGCCCCCCGTAGGAG
TCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAGCTAC
CGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTAGCTAATCGGCCGCGGG
CCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATTCCCATCAGAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCACTTCGAGGCAGGTTCC
CACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGAC
TTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D29

CCCTAGGCATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGATT
TGATATCGGCGGTCTCGCTAGACACGTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAATGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCAGGCGGAATACTTATCGCGTTAGCTACGGTACAGATAGTTTTGA
GACCACCTACACCTAGTATTCATCGTTTACCGCGTGGACTACCGGGGTATCTA
ATCCCGTTCGCTCCCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGGG
TGCCGCTTTCGCCACTGGTATTCCTCCCGATATCTACGCATTCCACCACTACA
CCGGGAATTCTACACCCCTCTCCTCGCCTCAAGCCGCCCAGTCTCCAACGACC
TCTCCCAGTTAAGCCAGGAGCTTTCACGTCAGACTTAAGCAGCCGCCTGCGT
GCGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCG
GCTGCTGGCACGTAGTTAGCCGTGACTTATTCCCCAGGTACCGTCCTCGCTCT
TCCCTGAGAAAAGGAGTTTACATCCGAAAACCGTCATCCTCACGCGGCGTTG
CTCGGTCAGGGTTGCCCCCATTGCCGAATATTCCTCACTGCTGCCCCCCGTAG
GAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAGC
TACCGATCATCGCCTTGGTGAGCCTTTACCTCACCAACTAGCTAATCGGCCGT
AGGCCCCTCTCAAAGCACTAAAGCTTTCCTGATAACGATTCCCATCGTCACCA
GCTTATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGCAG
GTCACCTGCGTCTTACTCACCCGTCCGCCACTTTCAAGGATACAAGTACCCTC
TCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample D27

CCCTGGTCATAAGGGCCATGATGACTTGACGTCATCCCCACCTTCCTCCGGTT
TGTCACCGGCAGTCTCCCTAGAGTTCCCACCATGACGTGCTGGCAACTAGGG
ACAGGGGTTGCGCTCGTTGCGGGACTTAACCCAACATCTCACGACACGAGCT
GACGACAGCCGTGCAGCACCTGTGTCAGTGTTCCCGAAGGCACATCTACCTC
TCGGCAGACTTCACTGCATGTCAAGACCAGGTAAGGTTCTTCGCGTTGCATCG
AATTAAACCACATGCTCCACCGCTTGTGCGGGCCCCCGTCAACTCCTTTGAGT
TTCAACCTTGCGGCCGTACTCCCCAGGCGGTCAACTTAATGCGTTTGCTTCGG
CACAGATGGGTTTAACTCCACCTACGCCTAGTATTCATCGTTTACAGCGTGGA
CTACCGGGGTATCTAATCCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCA
GGCTAATGCCAGAATGCCGCTTTCGCCTCAGATGTTCCCCCCGATATCTACAT
ATTCCACCATTACACCGGGGATTCCGCATTCCTCTCATCGCCTCAAGTCAAAC
AGTGTCCAACGACGTCTTCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATC
TGACCGCCTGCGTGCGCTCTACGCCCAGTAATTCCGGATAACGCTTGTCACCT
ACGTATTACCGCGGCTGCTGGCACGTAGTTAGCCGTGACTTATTCTTGGGGTA
CCATCCATTCTTTTCCCCCACAAAAGGAGTTTACAACCCTAAAGCCTTCATCC

TCCACGCGGCGTTGCTGGGTCAGGCTTTCGCCCATTGCCCAATATTCCTCACT
GCTGCCCCCCGTAGGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGT
CCTCTCAGACCAGCTACCGATAATCGCCTTGGTAAGCCTTTACCTTACCAACT
AGCTAATCGGCCGCGGGCCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATT
CCCATCAGAGCAGAACCGTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCC
CACTTCGAGGCAGGTTCCCACGTGTTACTCACCCGTTTGCCACTTTCAAATAT
TGCTATTCTCACGTTCGACTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D19

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGACT
TAAGATCGGCAGTCTCACTAGACACTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCGCTTCACTACTACCTGT
ATGTCAAACCCGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
CCACCTACGCCTAGTATTCATCGTTTACAGCGTGGACTACCGGGGTATCTAAT
CCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGCTAATGCCAGAATGC
CGCTTTCGCCTCAGATGTTCCCCCCGATATCTACATATTCCACCATTACACCG
GGGATTCCGCATTCCTCTCATCGCCTCAAGTCAAACAGTATCCAACGACGTCT
TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCGCCTGCGTGCGC
TTTACGCCCAGTAATTCCGGATAACGCTTGTCACCTACGTATTACCGCGGCTG
CTGGCACGTAGTTAGCCGTGACTTATTCTTGGGGCACCATCCATTCTTTTCCC
CCACAAAAGGAGTTTACAACCCTAAAGCCTTCATCCTCCACGCGGCGATGCT
GGGTCAGCTTTCGCCCATTGCCCAATATTCCTCACTGCTGCCCCCCGTAGGAG
TCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAGCTAC
CGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTAGCTAATCGGCCGCGGG
CCCCTCTCAAAGCGATAAATCTTTACCTGCTCCATTCCCATCAGAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCAGGTTC
CCACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGA
CTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample D13

CCCCGGATATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCTGCT
TCTCGCAGGCAGTCGGGCCAGACACGTGTAACTGACCCCGGGGGTTGCGCTC
GTTTTCGGACTTAACCGAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAGACGCTCCTTGCGGTCGCTCACCTTTCGGCTCGCTACTACGCCT
ATGTCAAACCCGGGTAAGGTTCTTCGTGTAGCCTCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGTCTTGCGACCGT
ACTCCCCAGGCGGCAGACTTATCGCGTTAGCTGTGGCGCCCCCTCCCTTGCGA
GAGTGGACACCGAGTCTGCATCGTTTACGGCTTGGACTACCGGGGTCTCTAAT
CCCGTTCGCTCCCCAAGCTTTCGTGCCTCAGCGTCAGTTGGGACCCAGGACGC

CGCTTCGCCTCTGGTGTTCCTCCGGATCTCTACACATTTCACCGCTCCACCCG
GAATTCCACGTCCCTCTATCCCACTCTAGTCCCACAGTCTCAAGCGCGTATTC
CCGGTTGAGCCGGAACCTTTCACACGTGACTTATGGCACCGCCTGCGCACGC
TTTACGCCCAGTAACTCCGGATAACGCTCGCCTCCTACGTTTTACCGCGGCTG
CTGGCACGTAGTTAGCCGAGGCTTATTCGCCACCTACCGTCCGTTCTCGTCAG
TGGCAAAAGGGCTTTACAACCCGAAGGCCGTCATCACCCACGCGGCGTCGCT
GCATCAGGGTTCCCCCCATTGTGCAATATTCCTCACTGCTGCCTCCCGTAGGA
GTCTGGGCCGTGTCTCAGTCCCAGTGTGAGGGATCATCCTCTCAGACCCCTTA
CGCGTCGTTGCCTTGGTAGGCCTTTACCCCACCAACTAGCTGATGCGCCGCAG
CCCCCTCTTCGGGCGTCTTGCCCCTTTTCTCTCTGGTCTCTACAACCCGGGAGC
TTATCCGGTCTTAGCGTCACTTTCGCGACGTTATCCCAGACCCAAAGGCAGGT
TAGCTACGTGTTCCTCACCCGTGCGCCACTATCTTGCGATCGTTCGACTTGCA
TGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample C97

GATGAACGCTGGCGGCGTGCTTAACACATGCAAGTCGAACGTGAGAGGGTAG
CAATATCCTTGAAAGTGGCGCACGGGTGAGTAATACGTAGGTAACCTGCCCT
GGAGTGGGGGATAACAACTGGAAACGGTTGCTAACACCGCATAATACCGGA
CATTCGGGAGAGTGACTGGTAAAAACTCTGGTGCTTCAGGAGGGGCCTGCGG
CCGATTAGCTAGTTGGTGGGGTAAAGGCCCACCAAGGCAGTGATCGGTAGCT
GGTCTGAGAGGACGACCAGCCACACGGGAACTGAGACACGGTCCCGACTCT
ACGGGGGGCAGCAGTGAGGAATATTGGGCAATGGGCGCAAGCCTGACCCAG
CAACGCCGCGTGGAGGAAGACGGCCTTCGGGTTGTAAACTCCTTTTACGGGG
GAAGAGGAAGGACGGTACCCCGAGAATAAGTCACGGCTAACTACGTGCCAG
CAGCCGCGGTAATACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAA
AGCGCACGCAGGCGGCGCTGTAAGTCTGACGTGAAATCTCCTGGCTTAACTG
GGAGGGGTCGTTGGAAACTGCAGTGCTTGAGGCGGTGAGAGGGGTGTAGAA
TTCCCGGTGTAGTGGTGGAATGCGTAGATATCGGGGGGAATACCAGTGGCGA
AAGCGGCACCCTGGCACTGGCCTGACGCTCATGTGCGAAGGCGTGGGGAGCG
AACGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTG
TGGGTGGAGTGAAATCCATCTGTGCCGCAGCAAACGCGATAAGTATTCCGCC
TGGGGAGTACGGCCGCAAGGCTAAAACTCAAAGGAATTGACGGGGGCCCGC
ACAAGCAGCGGAGCGTGTGGTTTAATTCGATGCAACACGAAGAACCTTACCT
GGGTTTGGCATACAGGTAGTAGTGAAGCGAAAGCGGAACAATCTTCGGAAGC
CTGTACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTA
AGTCCCGCAACGAGCGCAACCCTCGTCGCTAGTTACAAGTGTCTAGCGAGAC
TGCCGATCTTAAGTCGAAGGAAGGTGGGGATGATGTCAAGTCAGCATGGCCT
TTATATCTGGGG

>Activated Wastewater sample C91

CCCTAGGCATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGATT
TGATATCGGCGGTCTCGCTAGACACGTGTAACTAGCGACGAGGGTTGCGCTC

GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAATGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCAGGCGGAATACTTATCGCGTTGGCTGCGGTACAGATAGTTTTGA
GACCACCTACACCTAGTATTCATCGTTTACCGCGTGGACTACCGGGGTATCTA
ATCCCGTTCGCTCCCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGGG
TGCCGCTTTCGCCACTGGTATTCCTCCCGATCTCTACGCATTCCACCACTACA
CCGGGAATTCTACACCCCTCTCCTCGCCTCAAGCCGCCCAGTCTCCAACGACC
TCTCCCAGTTAAGCCAGGAGCTTTCACGTCAGACTTAAGCAGCCACCTGCGT
GCGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCG
GCTGCTGGCACGTAGTTAGCCGTGACTTATTCCCCAGGTACCGTCCTCGCTCT
TCCCTGAGAAAAGGAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGT
TGCTCGGTCAGGGTTGCCCCGTTGCCGAATATTCCTCACTGCTGCCCCCCGTA
GGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCGG
CTACCGATCATCGCCTTGGTGAGCCTTTACCTCACCAACTAGCTAATCGGCCG
TAGGCCCCTCTCAAAGCACTAAAGCTTTCCTGATAACGATTCCCATCAACACC
AGCTTATGCGGTATTAGCCATCGTTTCCAATGGTTATCCCCCACTTCAAGGCA
GGTCACCTACGTCTTACTCACCCGTCCGCCACTTTCAAAGATACAGGTACCCT
CTCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample C89

GATGAACGCTGGCGGCGTGCTTAACACATGCAAGTCGAACGTGAGGGTGTAG
CAATATGCCTGAAAGTGGCGAACGGGTGAGTAACACGTAGATGACCTGCCCT
GGAGTGGGGGATAACCACTGGAAACGGTGGCTAATACCGCATACATCCATAT
TTTTGGGAAGAGATGTGGGGAAAGCTCTGGTGCTCTGGGAGGGGTCTGCGTC
CGATTAGCTAGTTGGTGAGGTAAAGGCTCACCAAGGCGACGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAAACTGAGACACGGTCCCGACTCTA
CGGGGGCAGCAGTGAGGAATATTGGGCAATGGGCGAGAGCCTGACCCAGCA
ACGCCGCGTGGAGGAAGACGGCCTTCGGGTTGTAAACTCCTTTTGACAGGGA
AGAGAGAGGACGGTACCTGTCGAATAAGTCACGGCTAACTACGTGCCAGCAG
CCGCGGTAATACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAAAGC
GCACGCAGGCGGCTGCTTAGGTCTGACGTGAAATCTCCTGGCTTAACTGGGA
GGGGTCGTTGGAAACTGGGTGGCTTGAGGTGGTGAGAGGGGTGCAGAATTCC
CGGTGTAGTGGTGGAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAAAG
CGGCACCCTGGCCTTGGCCTGACGCTCAGGTGCGAAAGCGTGGGGAGCGAAC
GGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGTAG
GTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGCTAAGTATTCCGCCTGGG
GAGTATGACCGCAAGGTTAAAACTCAAAGGAATTGACGGGGGCCCGCACAA
GCAGCGGAGCGTGTGGTTTAATTCGATGCAACGCGAAGATCCTTACCTAGGC
TTGACGTAGTGGTAGTAGTGAAGTGAAAGCGGAACGACCCTTCGGGGAGCCA
TTACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAG
TCCCGCAACGAGCGCAACCCTCGTCGCTAGTTACACGTGTCTAGCGAGACCG

CCGATATCAGATCGGAGGAAGGTGGGGATGACGTCAAGTCAGCATGGCCTTT
ATGCCTAGGG

>Activated Wastewater sample C85

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGACT
TAAGATCGGCAGTCTCGCTAGACGCTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCACTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
CCACCTACGCCTAGTATTCACCGTTTACAGCGTGGACTACCGGGGTATCTAAT
CCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGCTAATGCCAGAATGC
CGCTTTCGCCTCAGATGTTCCCCCCGATATCTACATATTCCACCATTACACCG
GGGATTCCGCATTCCTCTCATCGCCTCAAGTCAAACAGTATCCAACGACGTCT
TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCACCTGCGTGCGC
TTTACGCCCAGTAATTCCGGATAACGCTTGCATCCTACGTCTTACCGCGGCTG
CTGGCACGTAGTTAGCCGATGCTTATTCCTGAGGTACCGTCAGAATTCTTCCC
TCAGAAAAGGAGTTTACGACGAAAACGCCTCCATCCTCCACGCGGTGTTGCT
CCGTCAGGCTTTCGCCCATTGCGGAAGATTCCTCACTGCTGCCTCCCGTAGGA
GTATGGACCGTGTCTCAGTTCCATTGTGGCTGATCATCCTCTCAGACCAGCTA
CCCGTCATAGCCTTGGTAAGCCGTTACCTTACCAACAAGCTGATAGGCCGCA
GGTTCCTCTTAGAGCGCATTACTGCTTTACCCTTGCGGGACAATCCGGTATTA
ACCTCTATTCCTAGAGGGTATCCCTGACTCTAAGGTAGATACCAACGTGTTAC
TCACCCGTCTGCCGCTCCCAGCACTCTGCCTTTGATGACTCAAAGACAAAGTG
CTGGGCGCTCGACTTGCATGTGTTATGCACACCGCCAGCGTTAATC

>Activated Wastewater sample C81

CCCTGGATATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGGTT
TTATACCGGCAGTCTCGCCAGACACTTGTAACTGGCGACAGGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTATAGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCT
ATATGTCAAACCCAGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGC
TCCGCTACTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCC
GTACTCCCCAGGCGGAGTACTTAGCGCGTTTGCTTCGGCACAGATGGATTTGA
CTCCACCCACACCTAGTACTCATCGTTTACGGCGTGGACTACCCGGGTATCTA
ATCCGGTTTGCTCCCCACGCTTTCGCCCCTGAGCGTCAGGACAGGGCCAGGA
TGCCGCCTTCGCCACTGGTGTTCCTCCAGATATCTACGCATTTCACCACTACA
CCTGGAATTCCACATCCCTCTCCCTGCCTCAAGCCTGGCAGTTTTCGAGGCGC
CCTCCCAGTTGAGCCGGGAGATTTCACCTCAAACTTGCCAGGCCGCCTGCGG
GCTCTTTACGCCCAATAAATCCGGACAACGCTTGACACCTACGTATTACCGCG
GCTGCTGGCACGTAGTTTAGCCGTGTCTTATTCGTGAGGTACCGTCAGAACTT

CTTCCCTCACAAAAGGGGTTTACGACCCGAGGGCCTTCGTCCCCCACGCGGA
ATTGCTGCGTCAGGCTTTCGCCCATTGCGCAAGATTCTTAGCTGCTGCCTCCC
GTAGGAGTCGGGGCCGTATCTCAGTCCCCGTGTGGCTGACCATCCTCTCAGA
CCAGCTACCGATCGTCGCCTTGGTAGGCCATTACCCCACCAACTAGCTAATCG
GCCGCGGGCCCCTCTCATAGCGCCGGAGCTTTTACCACCTGGTTTCTCACCAG
GGGTGTTATGCGGTATTAGCTCGCCTTTCGGCGAGTTATTCCCCACTACGAGG
CAGGTTACCCACGTGTTACTCACCCGTTCGCCACTAACCCGAAGGTTCGTACG
ACTTGCATGCCTAATACATTCCGCCAGCGTTTGTC

>Activated Wastewater sample C61

GATGAACGCTGGCGGCGTGCTTAACACATGCAAGTCGAACGTGAGGGTGTAG
CAATATGCCTGAAAGTGGCGAACGGGTGAGTAACACGTAGATGACCTGCCCT
GGAGTGGGGGATAACCATTGGAAACGGTGGCTAATACCGCATACATCCATAT
ATCTGGGAAGAGATGTGGGGAAAGCTCTGGTGCTCTGGGAGGGGTCTGCGTC
CGATTAGCTAGTTGGCGAGGTAAAGGCTCACCAAGGCGACGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGGCAGCAGTGAGGAATATTGGGCAATGGGCGAGAGCCGACCCAGCA
ACGCCGCGTGGAGGAAGACGGCCTTCGGGTTGTAAACTCCTTTTGACAGGGA
AGAGAGAGGACGGTACCTGTCGAATAAGTCACGGCTAACTACGTGCCAGCAG
CCGCGGTAGTACGTAGGTGACAAGCGTTATCCGGAATTACTGGGCGTAAAGC
GCACGCAGGCGGTCAGATAAGTCTGATGTGAAACCTTCTGGCTTAACCAGAA
GACGTCGTTGGATACTGTTTGACTTGAGGCGATGAGAGGAATGCGGAATCCC
CGGTGTAATGGTGGAATATGTAGATATCGGGGGGAACATCTGAGGCGAAAGC
GGCATTCTGGCATTAGCCTGACGCTCATGTGCGAAAGCGTGGGGAGCAAACG
GGATTAGATACCCCGGTAGTCCACGCTGTAAACGATGAATACTAGGCGTAGG
TGGAGTTAAACCCATCTGTGCCGAAGCAAACGCATTAAGTATTCCGCCTGGG
AAGTACGGCCGCAAGGCTAAAACTCAAAGGAATTGACGGGGGCCCGCACAA
GCAGCGGAGCGTGTGGTTTAATTCGATGCAACACGAAGAACCTTACCCAGGT
TTGACATACAGGTAGTAGTGAAGCGAAAGCGGAACGATCTTCGGAAGCCTGT
ACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAGTC
CCGCAACGAGCGCAACCCTCGTCGCTAGTTACAAGTGTCTAGCGAGACTGCC
GATCTTAAGTCGAAGGAAGGTGGGGATGATGTCAAGTCAGCATGGCCTTTAT
ATCTGGGG

>Activated Wastewater sample C55

CCCTGGATATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGGTT
TTATACCGGCAGTCTCGCCAGACACTTGTAACTGGCGACAGGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTATAGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCT
ATATGTCAAACCCAGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCC
GTACTCCCCAGGCGGAGTACTTAGCGCGTTTGCTTCGGCACAGATGGATTTGA

CTCCACCCACACCTAGTACTCATCGTTTACAGCGTGGACTACCGGGGTATCTA
ATCCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGTCAGTGCCAGGGT
GCCGCTTTCGCCACTGGTATTCCTCCCGATATCTACGCATTCCACCACTACAC
CGGGAATTCTGCACCCCTCTCACCACCTCAAGCCACCCAGTTTCCAACGACCC
CTCCCAGTTAAGCCAGGAGATTTCACGTCAGACTTAAGCAGCCGCCTGCGTG
CGCTTTACGCCCAGTAATTCCGGATAACGCTTGTCACCTACGTATTACCGCGG
CTGCTGGCACGTAGTTAGCCGTGACTTATTCGACAGGTACCGTCCTCTCTCTT
CCCTGTCAAAGGGAGTTTACAACCCGAAGGCCGTCTTCCTCCACGCGGCGTT
GCTGGGTCAGGCTCTCGCCCATTGCCCAATATTCCTCACTGCTGCCCCCGGTA
GGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCAG
CTACCGATCGTCGCCTTGGTGAGCCTTTACCTCACCAACTAGCTAATCGGACG
CAGACCCCTCCCAGAGCACCAGAGCTTTCCCCACATCTCTTCCCAAAAATATG
GATGTATGCGGTATTAGCCACCGTTTCCAGTGGTTATCCCCCACTCCAGGGCA
GGTCATCTACGTGTTACTCACCCGTTCGCCACTTTCAAGGATACAAGTACCCT
CTCACGTTCGACTTGCATGTGTTAGGCACGCCGCTAGCGTTCATC

>Activated Wastewater sample C48

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGGCT
TAAGATCGGCAGTCTCGCTAGACACTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCGCTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
CCACCTACGCCTAGTATTCATCGTTTACAGCGTGGACTACCGGGGTATCTAAT
CCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGCTAATGCCAGAATGC
CGCTTTCGCCTCAGATGTTCCCCCCGATATCTACATATTCCACCATTACACCG
GGGATTCCGCATTCCCCTCATCGCCTCAAGTCAAACAGTATCCAACGACGTCT
TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCGCCTGCGTGCGC
TTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCGGCTG
CTGGCACGTAGTTAGCCGTGACTTATTCCCCAGGTACCGTCCTCGCTCTTCCC
TGATAAAAGKAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGTTGCT
CGGTCAGGGTTGCCCCCATTGTCCAATATTCCCCACTGCTGCCCCCCGTAGGA
GTCGGGACCGTGTCTCAGTCCCGATGTGGCTGGTCATTCTCTCAAACCAGCTA
AAGATCGTCGCCTTGGTAGGCCTTTACCCTACCAACTAGCTAATCTTACGCGA
GCTCATCTAATAGCGCCTTGCGGCTTTCCCCCGTAGGGCGTATGCGGTATTAA
TCCAGCTTTCGCTGGGCTGTCCCCCTCTACTAGGCAGATTCCCACGTGTTACT
CACCCGTCCGCCGCTCTCAGGGCCGAAGCCCCTACCGCACGACTTGCATGTCT
TAAGCATACCGCCAGCGTTCAAT

>Activated Wastewater sample C47

CCCTAGGCATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGATT
TGATATCGGCGGTCTCGCTAGACACGTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTAATGGCTCCCCGAAGGGTCGTTCCGCTTTCACTTCACTACTACCA
CTACGTCAAGCCTAGGTAAGGTTCTTCGCGTTGCATCGAATTAAACCACACGC
TCCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAACCTTGCGGTC
GTACTCCCCAGGCGGAATACTTAGCGCGTTAGCTGCGGTACAGATAGTTTTG
AGACCACCTACACCTAGTATTCATCGTTTACCGCGTGGACTACCGGGGTATCT
ATCCCGTTCGCTCCCCACGCTTTCGCACCTGAGCGTCAGGCCAAGGCCAGGG
TGCCGCTTTCGCCACTGGTATTCCTCCCGATCTCTACGCATTCCACCACTACA
CCGGGAATTCTACACCCCTCTCCTCACCTCAAGCCGCCCAGTCTCCAACGACC
TCTCCCAGTTAAGCCAGGAGCTTTCACGTCAGACTTAAGCCGCCACCTGCGTG
CGCTTTACGCCCAGTAATTCCGGATAACGCTTGCCACCTACGTATTACCGCGG
CTGCTGGCACGTAGTTAGCCGTGACTTATTCCTCAGGTACCGTCCTCGCTCTT
CCCTGAGAAAAGGAGTTTACAATCCGAAAACCGTCATCCTCCACGCGGCGTT
GCTCGGTCAGGGTTGCCCCCATTGCCGAATATTTCCTCACTGCTGCCCCCCGT
AGGAGTCGGGACCGTGTCTCAGTTCCCGTGTGGCTGATCGTCCTCTCAGACCA
GCTACCGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTAGCTAATCGGCC
GCGGGCCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATTCCCATCAGAGCA
GAACCGTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCA
GGTTCCCACGTGTTACTCACCCGTTTGCCACTTTCAAGTATTGCTATTCTCACG
TTCGACTTGCATGTGTTAAGCACGCCGCCAGCGTTCAT

>Activated Wastewater sample C20

GATGAACGCTAGCGGCGTGCCTAACACATGCAAGTCGAACGTGAGAGGGTAC
TTGTATCCTTGAAAGTGGCGGACGGGTGAGTAAGACGTAGGTGACCTGCCTT
GAAGTGGGGGATAACCATTGGAAACGATGGCTAATACCGCATGGGCTGGTGA
TGATGGGAATCATTATCAGCAAAGCTTTAGTGCTTTGAGAGGGGCCTACGGC
CGATTAGCTAGTCGGTGAGGTAACGGCTCACCAAGGCGATGATCGGTAGCTG
GTCTGAGAGGACGATCAGCCACACGGGAACTGAGACACGGTCCCGACTCCTA
CGGGGGCAGCAGTGAGGAATATTCGGCAATGGGGGCAACCCTGACCGAGCA
ACGCCGCGTGGAGGATGACGGTTTTCGGATTGTAAACTCCTTTTCCCAGGGA
AGAGCGAGGACGGTACCTGAGGAATAAGTCACGGCTAACTACGTGCCAGCA
GCCGCGGTAATACGTAGGTGGCAAGCGTTATCCGGAATTACTGGGCGTAAAG
CGCACGCAGGTGGCGGCTTAAGTCTGACGTGAAAGCTCCTGGCTTAACTGGG
AGAGGTCGTTGGAGACTGGGCGGCTTGAGGCGAGGAGAGGGGTGTAGAATT
CCCGGTGTAGTGGTGGAATGCGTAGAGATCGGGAGGAATACCAGTGGCGAA
AGCGGCACCCTGGCCTTGGCCTGACGCTCAGGTGCGAAAGCGTGGGGAGCGA
ACGGGATTAGATACCCCGGTAGTCCACGCGGTAAACGATGAATACTAGGTGT
AGGTGGTCTCAAAACTATCTGTACCGCAGCTAACGCGATAAGTATTCCGCCT
GGGGAGTACGACCGCAAGGTTAAAACTCAAAGGAATTGACGGGGGCCCGCA

CAAGCAGCGGAGCGTGTGGTTTAATTCGATGCAACGCGAAGAACCTTACCTG
GTCTTGACATAGCAAGAACTTTCCAGAGATGATTGGTGCCTTCGGGAACTTAC
ATACAGGTGCTGCATGGCTGTCGTCAGCTCGTGTCGTGAGATGTTGGGTTAAG
TCCCGCAACGAGCGCAACCCTTTTCCTTATTTGCCAGCGGGTTAAGCCGGGA
ACTTTAAGGATACTGCCAGTGACAAACTGGAGGAAGGCGGGGACGACGTCA
AGTCATCATGGCCCTTACGACCAGGG

>Activated Wastewater sample B1

CCCTAGGCATAAAGGCCATGCTGACTTGACGTCATCCCCACCTTCCTCCGATT
TGATATCGGCGGTCTCGCTAGACACGTGTAACTAGACCCGGGGGTTGCGCTC
GTTTTCGGACTTAACCGAACATCTCACGACACGAGTTGACGACAGCCATGCA
GCACCTGTGCAAGCTCCCGAAGGTCGGTCCCCTTTCGGTTCCCTACCACTTGC
ATGTCAAACCCAGGTAAGGTTCTTCGCGTAGCCTCGAATTAAACCACACGCT
CCGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAATTTTAGCCTTGCGACCG
TACTCCCCGGGCGGCACACTTATCGCGTTGGCCGCGGCACTCAAGCAACCGT
AGTTGCCCGAACACCTAGTGTGCATCGTTTACGGCACGGACTACCGGGGTTTC
TAATCCCGTTCGCTCCCCGTGCTGTCGCGTCTCAGCGTCAGGTCAAGCCCAGG
ACGTCGCCTTCGCCACTGGTGTTCCTCCGGATCTCTACGCATTTCACCACTAC
ACCCGGAATTCCACGTCCCTCTACTCGCCTCTAGATATGCAGTCTTCAGCGCA
CTCTCCCAGTTTAGCCGGGAGCTTTCACGCCAAACTTGCACACCCGCCTACAC
GCTCTTTACGCCCAGTAACTCCGGATAACGCTCGCCTCCTACGTTTTACCGCG
GCTGCTGGCACGTAGTTAGCCGAGACTTGTTCCTGCGCTACCGTCCTCTCTCG
TCACGCAGAAAAGGGCTTTACGACCCGAAGGCCTTCGTCGCCCACGCGGCGT
CGCTGCGTCAGGTTTCGCCCATTGCGCAATATTCCYCACTGCTGCCTCCCGTA
GGAGTCTGGGCCGTGTCTCAGTCCCGATGTGGCTGATCATCCTCTCAGACCAG
CTACTGATCGTCGCCTTGGTGAGCCATTACCTCGCCATCTAGCTAATCGGTCG
CAGACCCCTCTTAATGCAATAAATCTTTCCTTGACGACATTCCCAGGCCATCA
AGCACATGCGGTATTAGCGACAGTTTCCCGTCGTTATCCCCCACATCAGGATA
GGTTATCTACGTGTTACTCACCCGTTCGCCACTTTCAGGTACATTGCTGCACC
TTCACGTTCGACTTGCGTGTGTTAAGCACGCCGCCAGCGTTCATC

>Activated Wastewater sample B8

CCCCAGATATAAAGGCCATGCTGACTTGACATCATCCCCACCTTCCTTCGACT
TAAGATCGGCAGTCTCGCTAGACACTTGTAACTAGCGACGAGGGTTGCGCTC
GTTGCGGGACTTAACCCAACATCTCACGACACGAGCTGACGACAGCCATGCA
GCACCTGTACAGGCTTCCGAAGATCGTTCCGCTTTCGCTTCACTACTACCTGT
ATGTCAAACCTGGGTAAGGTTCTTCGTGTTGCATCGAATTAAACCACACGCTC
CGCTGCTTGTGCGGGCCCCCGTCAATTCCTTTGAGTTTTAGCCTTGCGGCCGT
ACTTCCCAGGCGGAATACTTAATGCGTTTGCTTCGGCACAGATGGGTTTAACT
CCACCTACGCCTAGTATTCATCGTTTACAGCGTGGACTACCGGGGTATCTAAT
CCCGTTTGCTCCCCACGCTTTCGCACATGAGCGTCAGGCTAATGCCAGAATGC
CGCTTTCGCCTCAGATGTTCCCCCCGATATCTACATATTCCACCATTACACCG

GGGATTCCGCATTCCTCTCATCGCCTCAAGTCAAACAGTATCCAACGACGTCT
TCTGGTTAAGCCAGAAGGTTTCACATCAGACTTATCTGACCGCCTGCGTGCGC
CTTACGCCCAGTAATTCCGGATAACGCTTGTCACCTACGTATTACCGCGGCTG
CTGGCACGTAGTTAGCCGTGACTTATTCTTGGGGTACCATCCATTCTTTTCCCC
CACAAAAGGAGTTTACAACCCTAAAGCCTTCATCCTCCACGCGGCGTTGCTG
GGTCAGGCTTTCGCCCATTGCCCAATATTCCTCACTGCTGCCCCCCGTAGGAG
TCGGGACCGTGTCTCAGCTCCCGTGTGGCTGATCGTCCTCTCAGACCGGCTAC
CGATAATCGCCTTGGTAAGCCTTTACCTTACCAACTAGCTAATCGGCCGCGGG
CCCCTCTCAAAGCGATAAATCTTTATCTGCTCCATTCCCATCAGAGCAGAACC
GTGCGGTATTAGCGACCGTTTCCAATCGTTATCCCCCACTTCGAGGCAGGTTC
CCACGTGTTACTCACCCGTTTGCCACTTTCAAATATTGCTATTCTCACGTTCGA
CTTGCATGTGTTAAGCACGCCGCCAGCGTTCATC